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EAST-WEST TECHNOLOGY TRANSFER: A CONGRESSIONAL DIALOG WITH THE REAGAN ADMINISTRATION

A DIALOG

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JOINT ECONOMIC COMMITTEE
CONGRESS OF THE UNITED STATES

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LETTER OF TRANSMITTAL

DECEMBER 10, 1984.

To the Members of the Joint Economic Committee:

Transmitted herewith for the use of the Joint Economic Committee, Congress, and the general public is a study of East-West technology transfer policy entitled "East-West Technology Transfer: A Congressional Dialog With the Reagan Administration." This study was initiated in 1983 when a set of questions were sent by the committee to Cabinet officers and agency chiefs on a wide range of East-West technology trade issues.

The resultant dialog provides a comprehensive policy statement of the administration that can now be made available to interested parties. After receipt of the administration's responses, a workshop was organized, in concert with the Congressional Research Service [CRS], to discuss and analyze the dialog with administration officials. In June 1984, an opportunity was afforded to the administration to update its responses. No substantive changes were indicated in the responses received by the Committee.

The study contains a series of Joint Economic Committee questions, administration responses, background analyses provided by the CRS of the Library of Congress, and supporting documents.

The rationale for the new direction of export control policy under the Reagan administration is explained in some detail. This study should be of great assistance in interpreting current and future administration actions in this area as it represents the most comprehensive policy statement on the issue made by the administration to date.

The study was directed and edited by Chris Frenze and Richard F. Kaufman of the committee staff, and John Hardt, with the assistance of Donna Gold, of the CRS, Library of Congress. We are deeply grateful to the Congressional Research Service for its many valuable contributions to this project.

Sincerely,

ROGER W. JEPSEN,
Chairman,
LEE H. HAMILTON,
Vice Chairman,
Joint Economic Committee.

FOREWORD

By Senator Roger W. Jepsen, Chairman *and* Representative Lee H. Hamilton, Vice Chairman

United States export control policy is a fairly good barometer of U.S. foreign policy and the state of international relations. During the era of detente, U.S. export controls were relaxed significantly. Current U.S. technology trade policy in large measure reflects the international climate ushered in by the Soviet invasion of Afghanistan. The diplomatic response of the United States and its allies to this and other actions of the U.S.S.R. and other Soviet bloc nations has generally included a tightening of export controls. Conversely, gradually improving relations between the United States and the Republic of China have occasioned a relaxation of U.S. export controls to that country, particularly on high technology and dual-use items. Apart from the issue of East-West relations, technology transfers to underdeveloped nations can have grave implications, especially with respect to nuclear energy technology. The problem of nuclear proliferation raises a number of disturbing questions concerning the possible use of nuclear technology for military purposes, or intentional or unintentional transfer to terrorists.

The following question and answer dialog between the Congress and the administration is intended to inform Congress, business, academe, and the public of current U.S. policy regarding East-West technology transfers. The administration's responses were received in 1983. A workshop with administration officials was subsequently held to go over some of the answers. In June 1984, Cabinet officers and other respondents of our inquiry were provided an opportunity to update their responses as the document went to press. We are satisfied, therefore, that the replies contained in this volume represent current administration views.

The dialog itself is divided into 15 sections, covering a wide range of East-West technology transfer issues. This is probably the most comprehensive statement of current U.S. policy in this area to date. Two appendixes provide additional information: the first, provided by the administration, includes a compilation of selected legal and illegal acquisitions of Western technology affecting Soviet military technology, and other material on technology transfers. The second appendix consists of commentaries on the dialog by the staff of the Congressional Research Service of the Library of Congress. There is also a bibliography of relevant sources prepared by the Congressional Research Service.

The administration's responses reflect the more restrictive U.S. export control policy initiated in the last 3 years. Throughout the dialog, the administration emphasizes the need for strict prevention of technology transfer potentially harmful to U.S. national security. The main objective of national security controls is to pre-

serve the lead of the United States and other advanced industrial nations in high technology and related equipment and not provide technology transfers that would directly and significantly enhance the military capability of potential adversaries.

National security controls are applied to the export of goods or technology which would make a significant contribution to any country or group of countries which could be detrimental to U.S. security. While recognizing that export controls undercut business interests, the cost is viewed as worth the contribution to national security. The administration explains that control of militarily critical technologies has been effective in delaying their use by potential adversaries, principally the Soviet Union. It cites a number of examples where the Soviet use of Western technology has harmed national security, for example, by permitting the Soviets to increase the accuracy of their missile guidance system for intercontinental ballistic missiles.

The administration indicates that export controls will continue as a tool of foreign policy. The maintenance of oil and gas equipment export restrictions imposed after the invasion of Afghanistan is an example of the use of export controls as instruments of foreign policy, though this technology is also known to have some military applications. The effectiveness of export controls and trade sanctions to signal disapproval or raise the cost of an action or policy of another country is defended. The administration acknowledges that the economic impact of such measures depends on the cooperation of alternative suppliers. It is clear, for instance, that the efficacy of the Siberian gas pipeline sanctions was undermined by the willingness of other nations (and competitors) to supply the necessary equipment.

In several places in the dialog, the administration notes the importance of international cooperation for the effectiveness of U.S. export control policy. Consequently, it is not surprising that the administration has placed a high priority on revitalizing CoCom. While many harmful transfers have been halted by this organization, the administration views CoCom controls and enforcement procedures as inadequate. Continued progress within CoCom appears to offer the prospect of more coordinated export control policies among the western industrial nations.

Although needed, both foreign policy and national security controls must be applied in ways which do not unnecessarily undermine the benefits to the United States of East-West trade. A fine balance must be struck between foreign policy and military considerations on the one hand, and economic benefits on the other. While virtually everyone concedes the importance of some form of export control, the obvious question is how far to go. It is clear that all exports of militarily critical technologies can be prevented by simply stopping all technology trade with the Soviet bloc; however, most would consider the costs excessive and unnecessary to protect national security. Less extreme and expensive export control policy can well shield national security while permitting the United States to benefit from trade with the East.

Even after the principles and criteria of technology transfer policy are agreed upon and established, great practical difficulties arise in implementing them. The problems of dual-use technologies,

diversion, extraterritorial enforcement, alternative sources of supply, to name a few, are far from being solved. The extent of uncertainty and the gray areas in the application of technology trade controls often make interpretation of the policy difficult. It is hoped that this dialog will contribute to public understanding of current policy.

East-West Technology Transfer: A Congressional Dialog With the Reagan Administration is one of a series of Joint Economic Committee publications that have included *East-West Commercial Policy: A Congressional Dialog With the Reagan Administration,* February 1982, and *Issues in East-West Commercial Relations,* January 1979.

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EAST-WEST TECHNOLOGY TRANSFER: A CONGRESSIONAL DIALOG WITH THE REAGAN ADMINISTRATION

Committee Questions and Administration Responses

SECTION 1. BACKGROUND FACTS ABOUT EAST-WEST TRADE

TRADE SHARES

Question 1a. What portion of Western trade with East European countries, the Soviet Union, and non-European CMEA members is U.S. trade?

Answer. U.S. share of Western trade in 1981 was as follows:

[In percent]

	U.S. share of—		
	Exports	Imports	Turnover
Western trade with:			
Eastern Europe	8.9	6.3	7.7
U.S.S.R.	9.6	1.6	5.6
Non-European CMEA	0.6	0.6	0.6

WESTERN [1] AND U.S. TRADE WITH CMEA, 1981

[In billions of dollars]

	Eastern Europe	U.S.S.R.	Non-European CMEA [4]
Western exports [2]	21.3	25.0	[5] 1.7
U.S. exports [3]	1.9	2.4	0.01
(U.S. share)	(8.9%)	(9.6%)	(0.6%)
Western imports [2]	19.0	25.3	[5] 0.8
U.S. exports [3]	1.2	0.4	0.005
(U.S. share)	(6.3%)	(1.6%)	(0.6%)
Western/CMEA turnover [2]	40.3	50.3	[5] 2.5
U.S. turnover [3]	3.1	2.8	0.016
(U.S. share)	(7.7%)	(5.6%)	(0.6%)

[1] When referring to trade with Eastern Europe and the U.S.S.R., "Western" is defined as the countries of Western Europe (including Yugoslavia and Turkey), North America, and Japan. When referring to trade with non-European CMEA, "Western" is defined as the members of OECD, that is, the countries of Western Europe (including Turkey but excluding Yugoslavia), North America, plus Japan, Australia and New Zealand.
[2] Source: Economic Bulletin for Europe, vol. 34, United Nations.
[3] Source: FT 990, Highlights of U.S. Export and Import Trade, U.S. Bureau of Census, December 1981.
[4] Mongolia, Vietnam, and Cuba—Mongolian data not available.
[5] Source: Statistics of Foreign Trade, Monthly Bulletin, December 1982, O.E.C.D.

TRADE PRODUCTS

Question 1b. How much of West European and U.S. trade with Eastern Europe and the Soviet Union is: (a) agricultural; (b) indus-

trial; (c) high technology; (d) energy products and equipment and technology?

Answer. (a) and (b) The distribution of West European and U.S. trade with Eastern Europe and the Soviet Union in agricultural and manufactured goods is shown in the attached Tables 1 and 2.

(c) In 1981 Western Europe, Canada and Japan shipped approximately $3,340 million worth of high-technology items [1] to the U.S.S.R. and Eastern Europe; these items amounted to 10.2 percent of their total exports to the area. In the same year, the U.S. exported some $119 million worth of high-technology items to the U.S.S.R. and Eastern Europe, or 2.8 percent of its total exports to the area.

(d) Data are not immediately available as to the amount of Western exports embodying energy-related technology to the U.S.S.R. and Eastern Europe. The figure has probably been relatively small in most years, except when the U.S.S.R. bought a large number of gas turbines from the West to drive its new gas export pipeline.

As to energy products and equipment, the largest components in East-West energy trade are Soviet sales of oil and natural gas to Western Europe and Western sales of large-diameter steel pipe to the U.S.S.R. Soviet orders for Western large diameter pipe and oil and gas equipment totaled $7.4 billion over the 1976–80 period, distributed among the countries shown in the attached chart. They thus accounted for up to 10 percent of all Western sales to the U.S.S.R. over the period. Western purchases of Soviet oil and gas in 1980, on the other hand, came to some $17 billion, or around 70 percent of Soviet exports to the Developed West; this amounted to only 4–5 percent the total estimated value of Western consumption of oil and gas in that year, however.

TABLE 1.—WEST EUROPEAN TRADE IN AGRICULTURAL COMMODITIES [1] AND MANUFACTURED GOODS,[2] 1980

[In millions of U.S. dollars]

	Total	Agricultural	Manufactured
West European exports to Eastern Europe	16,870	2,489	13,208
Percent of total	100	15	78
Wesw$European exports to U.S.S.R	14,725	2,239	12,093
Percent of total	100	15	82
West European imports from Eastern Europe	16,510	2,226	8,969
Percent of total	100	13	54
West European imports from U.S.S.R	21,489	606	2,884
Percent oi total	100	3	13

[1] Agricultural Commodities are defined here as consisting of SITC 1-digit commodities 0, 1, and 4, plus SITC 2-digit commodities 21, 22, 26, and 29.

[2] Trade in manufactured goods is defined here as all trade included in SITC 1-digit commodities 5 through 8. It thus excludes trade in energy materials (SITC category 3), the principal component of trade not accounted for in the table.

Source: Trade by Commodities, Market Summaries, Exports and Imports, January–December 1980, OECD.

[1] As defined in a study published by the U.S. Department of Commerce International Trade Administration in February 1982, entitled "Quantification of Western Exports of High-Technology Products to Communist Countries." The items so defined are reproduced in Table 3.

TABLE 2.—U.S. TRADE IN AGRICULTURAL COMMODITIES [1] AND MANUFACTURED GOODS,[2] 1981

[in millions of U.S. dollars]

	Total	Agricultural	Manufactured
U.S. exports to Eastern Europe	1,904	1,514	256
Percent of total	100	80	13
U.S. exports to U.S.S.R.	2,339	1,665	559
Percent of total	100	71	24
U.S. imports to Eastern Europe	1,207	217	818
Percent of total	100	18	*....END OF BAD MAG TAPE BLOCK*68
U.S. imports from U.S.S.R	347	13	187
Percent of total	100	4	54

[1] Trade in agricultural commodities is defined as all trade included in the U.S. Department of Agriculture "Agricultural or Nonagricultural Code" 1-digit category "0".

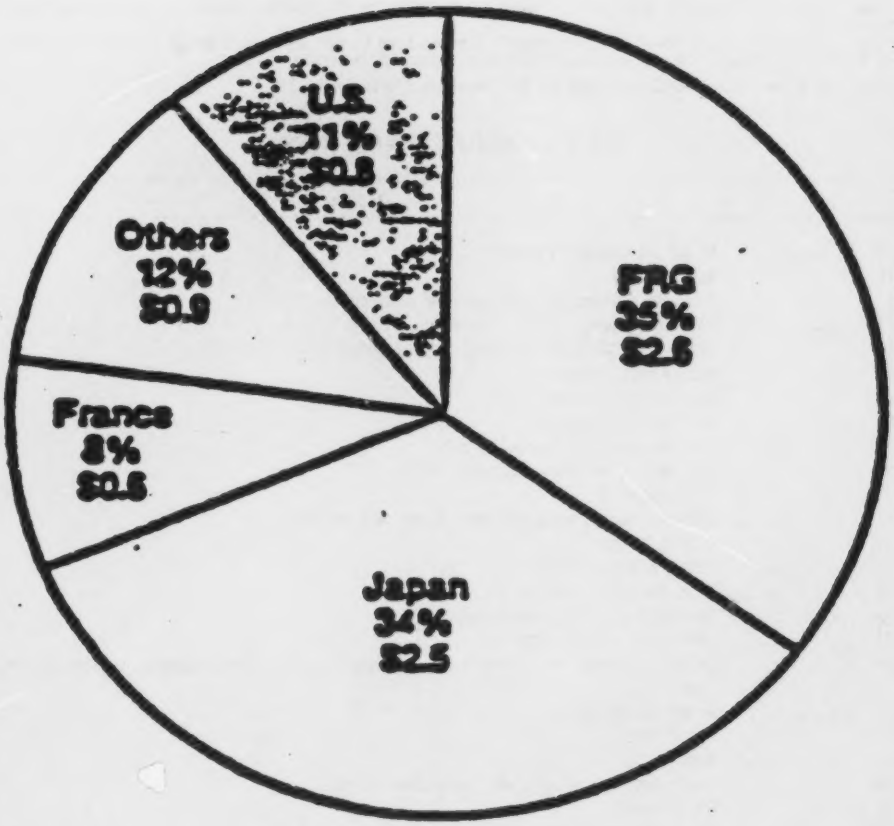
[2] Trade in manufactured goods is defined as all trade included in Schedules A and E 1-digit commodities 5 through 8. It thus excludes trade in energy materials (SITC category 3), the principal component of trade not accounted for in the table.

Source: Trade Status with Communist Countries, Sept. 10, 1982, Department of Commerce.

TABLE 3.—HIGH-TECHNOLOGY ITEMS

SITC	Description
7142	Jet and gas turbines for aircraft.
7117	Nuclear reactors.
7142	Calculating machines (including electronic computers).
7143	Statistical machines (punch card or tape).
71492	Parts of office machinery (including computer parts).
7151	Machine tools for metal.
71852	Glass-working machinery.
7192	Pumps and centrifuges.
71954	Parts and accessories for machine tools.
7197	Balls, roller or needle-roller bearings.
71992	Cocks, valves, etc.
7249	Telecommunications equipment (excl. TV and radio receivers).
726.2	X ray apparatus.
72911	Primary batteries and cells.
7293	Tubes, transistors, photocells, etc.
72952	Electrical measuring and control instruments.
7297	Electron and proton accelerators.
7299	Electrical machinery, n.e.s. (including electromagnets, traffic control equipment, signalling apparatus, etc).
7341	Aircraft, heavier than air.
73492	Aircraft parts.
7351	Warships.
73592	Special purpose vessels (including submersible vessels).
8611	Optical elements.
8612	Optical instruments.
86161	Image projectors (might include holograph projectors).
8619	Measuring and control instruments, n.e.s.
852.4	Photographic film.
891.1(1)	Gramphones, tape recorders, etc. (videorecorders).

Soviet Orders for Western Large Diameter Pipe and Oil and Gas Equipment: 1976-80



$7.4 Billion

Source: U.S. Government Estimates

TRADE BALANCE

Question 1c. Does Western Europe [2] have a trade surplus or deficit with the Warsaw Pact Nations? Does the United States have a trade deficit or a surplus?

Answer. In 1981, Western Europe incurred a $4.6 billion trade deficit with the Warsaw Pact nations. A $1.1 billion surplus with the East European Warsaw Pact nations was counterbalanced by a $5.7 billion deficit with the U.S.S.R. This continued the trend begun in 1979, of overall deficits with the Warsaw Pact nations. Prior to 1979, Western Europe had consistently enjoyed trade surpluses with the Warsaw Pact Nations.

In 1981, the U.S. enjoyed a $2.8 billion surplus with the Warsaw Pact nations. Of this, the surplus with the Soviet Union totalled $2.1 billion, while the surplus with Eastern Europe was $700 million.

U.S. SUBSIDIARIES

Question 1d. To what extent is West European trade with CMEA members comprised of U.S. subsidiaries?

Answer. The most recent survey showing sales of U.S. subsidiaries in Western Europe is one published by the Bureau for Economic Analysis in 1977 entitled "U.S. Direct Investment Abroad," 1977. It indicates that sales in that year by majority-owned U.S. subsidiaries in Western Europe to the U.S.S.R. and Eastern Europe amounted to $2,544 million—almost exactly equal to U.S. domestic exports to the area, which were $2,542 million. Otherwise stated, sales by U.S. subsidiaries in Western Europe to the U.S.S.R. and Eastern Europe in 1977 accounted for around 11 percent of all Western European OECD exports to that area in that year, which came to $23,103 million.

SECURITY-SENSITIVE HIGH TECHNOLOGY

Question 1e. What portion of West European trade with the Warsaw Pact group is in security sensitive high technology?

Answer. To the extent that currently existing export controls can be said to be effective, no portion of West European (or Japanese) trade with the Warsaw Pact is in security sensitive high technology items. All such items would be blocked from shipment to the Warsaw Pact by rules mutually applied by member nations of the Coordinating Committee (COCOM)—all the NATO nations except Iceland, plus Japan. Clandestine organization of course has to be taken into account. From the West's viewpoint, there may be divergence of opinions as to what "security sensitive" high technology consists of, and such matters have to be worked out in COCOM. In any case, the changing nature of technology causes the concept of security sensitivity to be subject to continually renewed examination.

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[2] Here the term "Western Europe" refers to the countries of Western Europe, including Yugoslavia and Turkey.

Sources: For European data, the Economic Bulletin for Europe, vol. 34, United Nations. For U.S. data, the FT 990, Highlights of U.S. Export and Import Trade, U.S. Bureau of the Census.

DUAL-USE TECHNOLOGY

Question 1f. How does West European dual-use technology compare in quality and quantity with U.S. dual-use technology in general? Is the highest quality West European dual-use technology produced by U.S. subsidiaries?

Answer. West European dual-use technology is in general on a par with U.S. dual-use technology. Much but by no means all of this is produced by U.S. subsidiaries. The trend in recent decades is illustrated by the electronics area. Twenty years ago, the United States was the clear leader in computers and in microelectronics generally. At that time, several multinational U.S. firms established subsidiaries in Western Europe. Today, many European firms which are not U.S. subsidiaries compete with U.S. firms in this area.

EUROPEAN PURCHASES OF SOVIET ENERGY

Question 1g. Will European purchases of Soviet energy supplant European purchases of energy from developing countries?

Answer. West European purchases of energy from the Soviet Union are not likely to supplant in a significant way purchases of energy from developing countries in the next two decades.

Total West European imports of all types of energy from the Soviet Union are not likely to increase significantly over the next decade and perhaps beyond under current arrangements. West European imports of Soviet gas are scheduled to increase rapidly. However, imports of Soviet oil are likely to decline, because the Soviets will probably not be able to market as much oil for hard currency as they do at present. This is because Soviet production will probably continue to stagnate or decline, while domestic oil needs increase and the need to supply the basic oil needs of Eastern Europe continues.

As demand rises in Western Europe for new gas to replace or augment current supplies in the 1990's, competition for sales will probably take place chiefly between the Soviet Union and Norway. Gas from Nigeria, Cameroon, Qatar, Iran, and Canada may also be available. European purchasing decisions will presumably include pricing, security, and political considerations. In negotiating gas purchases two years ago, the West Europeans considered Soviet gas superior to Nigerian and Algerian gas in terms of price and reliability.

SECTION 2. OUTLOOK FOR TECHNOLOGY TRANSFER

SHARES OF TOTAL TRADE TURNOVER

Question 2a. What share of U.S. total trade turnover and U.S. GNP is U.S. trade with the Soviet Union and Eastern Europe?

Answer. Total trade turnover of the U.S. in 1981 totalled $494.7 billion. U.S. trade turnover with the Soviet Union for the year 1981 was $2.8 billion, or 0.6% (six-tenths of one percent) of U.S. total trade turnover. U.S. trade turnover with the countries of Eastern Europe in 1981 amounted to $3.1 billion, or 0.6% (six-tenths of one percent) of U.S. total trade turnover. If these figures are combined,

U.S. trade turnover with Eastern Europe and the U.S.S.R. for 1981 was $5.9 billion, or 1.2% (one and two-tenths percent) of U.S. total trade turnover.

In relation to U.S. GNP for 1981, the percentage breakdown is as follows. With a 1981 U.S. GNP of $2,938 billion, the trade turnover with the Soviet Union in 1981 of $2.8 billion amounts to 0.09% (nine one-hundreths of one percent) of U.S. GNP. The 1981 trade turnover of $3.1 billion with Eastern Europe amounts to 0.1% (one-tenth of one percent) of U.S. GNP. U.S. 1981 trade turnover with Eastern Europe and the Soviet Union combined was $5.9 billion or 0.2% (two-tenths of one percent) of U.S. GNP.[3]

TECHNOLOGY TRANSFER OVER THE NEXT 10 YEARS

Question 2b. How does the Reagan Administration evaluate opportunities for the transfer of U.S. technology to individual countries of the Soviet Bloc and to the Bloc as a whole over the next ten years? How great could trade volume become if no controls were applied?

Answer. Exports of U.S. high technology products to the U.S.S.R. and Eastern Europe in recent years have contributed under 5% of our total exports to the East. After peaking in 1976 at $283 million (8% of U.S. exports), they declined steadily to $119 million in 1981 (2.7%).

Future opportunities for U.S. high technology sales to the East are difficult to predict. They depend at least as much on factors beyond U.S. control as they do on American export policies. Factors limiting future Eastern imports of U.S. high technology products include:

Decreased availability of hard currency and Western credits.

Slowing Eastern investment and declining economic growth.

Possible reassessment by the East European countries and the U.S.S.R. of the need for imported Western technology, except in key sectors, mainly as a result of (a) problems with assimilation and diffusion of imported technology and (b) vulnerability to economic sanctions.

Soviet and East European high technology purchases from the Industrialized West (IW) have not increased in volume since 1978. They totaled about $4.5 billion annually during 1978–80 and registered a decline to $3.5 billion in 1981. Soviet equipment orders have shown a declining trend since 1976.

Given the limiting factors noted above, we would not expect Soviet and East European high technology imports to average more than $5 billion (1981 prices) annually or to fall below $3 billion annually over the next ten years.

The U.S. share of high technology exports of the Industrialized West to the U.S.S.R. and Eastern Europe, in the absence of export controls, could rise above the 1981 level of 5.7%. Because of the past disruption of trade due to sanctions, however, such a change would presumably not occur for several years

[3] Source: GNP figure from International Economic Indicators, December 1982, U.S. Department of Commerce, U.S. Trade figures from FT-990, Highlights of U.S. Export and Import Trade, U.S. Bureau of Census.

and exports could be expected to remain well below the 1977 record of 10.6%.

U.S. LONG-TERM OBJECTIVES

Question 2c. What does the Reagan Administration feel the long-term objectives of the United States should be with respect to technology transfer to the Soviet Union and the Bloc as a whole?

Answer. In the long-run, as at present, the United States seeks to restrict the flow of critical Western technology to the Soviet Union that could contribute substantially to the improvement of Soviet military capabilities either directly or indirectly by strengthening defense-priority industries. To this end we have been reviewing our export control system with a view toward tightening restrictions on high technology exports to the U.S.S.R. while decontrolling products at the lower-end of the technology spectrum. We are also working with our Allies in COCOM to strengthen multilateral controls on critical technology and equipment exports to the U.S.S.R.

ECONOMIC AND MILITARY VALUES OF TECHNOLOGY TRANSFER

Question 2d. Can the U.S. Government approximate a comparison of the economic value of U.S.-Eastern trade in terms of jobs and capital formation with the military value of such trade to the Soviet Bloc? Is the trade-off between the two worthwhile?

Answer. The potential military value to the Soviet Bloc of U.S.-Eastern trade must be analyzed in terms of the types of goods traded. Since 70–80 percent of U.S. sales each year to the Soviet Union and Eastern Europe consist mainly of agriculture products, they do not directly contribute to Warsaw Pact military strength. Such exports, paid for in cash or by short-term commercial credit, claim a large portion of Eastern Bloc hard currency earnings. They thus limit the ability of the Eastern countries to buy Western equipment and technology which could strengthen the Eastern industrial base and directly or indirectly benefit the Soviet military effort. At the same time, it has been argued that grain sales permit the USSR in particular not to have to transfer productive resources to the agricultural sector to grow desired additional quantities of grain. Such transfers, which might include resources at present directly supporting military production, might be especially burdensome for the USSR because of its comparative disadvantage in grain growing.

U.S. exports of manufactured goods to the Soviet Union and Eastern Europe also do not contribute directly to Warsaw Pact military potential because items of strategic value are rigorously excluded from shipment under U.S. export controls. Shipments of manufactures, moreover, have been relatively minor in comparison with total exports of manufactures to the U.S.S.R. and Eastern Europe by all countries in the Industrial West. For the U.S. they have ranged from $780 million to $980 million annually since 1979, or under 4 percent of the amount shipped by the Industrial West as a whole.

U.S. exports to the Warsaw Pact of so-called high-technology manufactures have also been small in relation to similar exports

by the rest of the Industrial West, having amounted in 1981 to 3.6 percent of total IW exports of such items.

Despite their small value, U.S. high-technology exports may be of more value in industrial processes related to military production because of their advanced nature.

On the other hand, U.S. exports as a whole to the U.S.S.R. and Eastern Europe have been a source of significant commercial gain for the United States. U.S. grain sales to the area have accounted for 16–23 percent of total U.S. grain exports in recent years. These sales, part of which have been guaranteed by long-term commitments by the East, have made significant contribution to U.S. farm income, at a time of ample world grain supplies and hence relatively depressed prices. Prior to sanctions imposed as a result of events in Afghanistan and Poland, U.S. exports of capital goods to the U.S.S.R. and Eastern Europe have also been significant for certain American industries, such as machine tools, farm and construction equipment, textiles, medicines, and oil production equipment. In sum, over the years the United States has realized substantial balance of payments benefits owing to its trade with the U.S.S.R. and Eastern Europe. Since 1975 these surpluses have ranged from $1.6 billion (1977) to $3.8 billions (1979).

At the same time, the volume of U.S. exports to the U.S.S.R. and Eastern Europe has helped to create U.S. job opportunities. It is estimated that the amount of immediate job opportunities created in 1979 was 135,000 and in 1982, because of substantially lower trade 85,000. Over the longer term, the number of job opportunities created by these exports are greater, as GNP multiplier effects have a chance to make themselves felt. Since the profit rate of U.S. firms varies so widely, it is not feasible to estimate what this volume of exports represents in terms of business capital formation.

It is thus unrealistic and misleading to try to balance in dollar terms the gains in U.S.-Eastern trade for the United States with the potential gains accruing to Soviet and East European military capabilities. From the United States' point of view, the gains are long-term and not immediately measurable in dollars. From the viewpoint of possible enhancement of Warsaw Pact military capabilities, the benefits are often intangible, involving largely improvement of weaponry and speeding up a military production programs, through legally or illegally acquired Western technology.

Regarding technology transfer, it should be emphasized that illegal acquisitions play at least as great a role in improving Warsaw Pact military capabilities as do legal purchases, and should not be included in any assessment of costs and benefits resulting from legal technology sales. Moreover, in sales volume, the rest of the Industrial West far outweighs the United States and so might have a greater quantitive, if not qualitative, effect on possible Warsaw Pact military enhancement. These observations should be borne in mind in taking note of a recent CIA study, "Soviet Acquisition of Western Technology," which concluded that the gains made to Western firms by the sale of equipment and technology clearly do not outweigh the Western military expenditures needed to overcome or defend against Warsaw Pact military capabilities derived by the acquisition of Western technology.

To make a balance of costs and benefits in broader economic sense, then, it might best simply be noted that trade always helps realize the comparative advantage of both parties engaging in it. If it improves Eastern military capabilities even indirectly, it improves ours as well, in the sense of raising our economic well-being above what it would be if we did not engage in trade.

Section 3. The Eastern Economies

DEPENDENCY ON WESTERN TECHNOLOGY

Question 3a. To what extent are the East European and Soviet economies dependent on Western technology?

Answer. In its most extreme sense, i.e., need for Western technology for economic and military survival, the U.S.S.R. and Eastern Europe cannot be said to be dependent on the West. At the same time, a total cut-off from Western technology over the longer term would greatly widen the East-West technology gap and adversely affect Eastern European and Soviet economic performance.

The U.S.S.R. throughout most of its history has looked to the West for infusions of technology and equipment to overcome shortages and production bottle-necks, and to accelerate technology, industrial and infrastructure development and save R&D resources. In the 1970s the U.S.S.R. and Eastern Europe greatly expanded their use of Western technology. As a result, these countries have increased their dependency on the West, since in many cases the ability to keep such equipment as well as entire turnkey facilities operating effectively is contingent on continuing access to Western replacement and spare parts and technical services. U.S.S.R. sources have referred to at least 350 plants that are heavily dependent on Western imports. In addition, the Soviet Union and Eastern Europe have a continuing need for Western technology to help meet their targets for upgrading and modernizing their industries, improving their transportation systems and raising labor productivity, to help maintain some growth in living standards, and to help provide some relief from the resource squeeze. The fact that the U.S.S.R. maintains its commitment of substantial resources to the acquisition, legal and clandestine, of civilian and military technology is telling evidence of a Soviet perception of need for Western technology.

INFLUENCE OF WESTERN TECHNOLOGY

Question 3b. What influence do Western technology, equipment, grain, and credits have on the efficiency and quality of the Soviet and East European economic performance in following areas: (a) military; (b) agriculture; (c) energy; (d) metallurgy; (e) computers?

Answer. It is not possible to quantify the impact which Western exports of equipment and technology have had on the quality and efficiency of East European and Soviet production. Generally, such exports enable the East Europeans and Soviets to upgrade the level of their technological development, although the quality of their manufactured products still lags behind similar products produced in the West.

The ability of the Soviet Union and the East European countries to benefit fully from Western infusions of technology and equipment is limited by the nature of these countries' centrally-planned economic systems. Problems endemic to a centrally-planned system, including lack of incentives, non-efficient use of labor and capital, artificial pricing and costing, and insufficient flexibility of the planning apparatus, generally have impeded these countries' progress in achieving gains in labor productivity, in energy saving, and in improving the quality of their exports to meet Western standards. To some extent, Western exports of foodstuffs, equipment and technology have allowed East European planners to postpone difficult choices concerning resource allocation and changes in their economic systems. Furthermore, the East Europeans have not succeeded in adjusting their foreign trade policies to respond to deterioration in terms of trade brought about by the worldwide rise in raw material prices. Consequently, their hard currency payments have been kept in balance not by increasing exports, but by increased borrowing.

Since the mid-1970's the Soviet Union has used medium and long-term credits, both official and commercial, to finance a significant portion of its imports of Western technology and equipment for certain key sectors, e.g., the energy, chemical and automotive industries. From 1971 to 1978 Western credits provided the U.S.S.R. with 10%–15% of its available hard currency. In 1979 and 1980 increased hard currency revenues resulting from jumps in world oil and gold prices permitted the Soviet Union to import more from the West without adding to its debt burden. In 1981, soft markets for petroleum and gold, the U.S.S.R.'s primary hard currency earners, compelled the U.S.S.R. to increase borrowing. Moscow has even had to finance some grain imports with short-term Western loans. Increased hard currency exports and curtailed imports allowed the Soviet Union to keep from substantially increasing its hard currency borrowing in 1982.

The Soviets' strategic weapons program has benefited substantially from the acquisition, legal and illegal, of Western technology. The Soviet ballistic missile system in particular has, over the past decade, demonstrated improvements that probably would not have been achieved without the use of Western ballistic guidance and control technology. The most striking example of this is the marked improvement in the accuracy of the latest Soviet ICBM's. Western technology has been of great benefit also to both the Soviet military and commercial aircraft development programs.

In the area of naval systems, the U.S.S.R. has obtained technology from the West, not readily available to them, that is critical to their programs. Specifically, the U.S.S.R. has acquired technology in areas related to aircraft carriers, deep sea diving capabilities, sensor systems for antisubmarine warfare and navigation, and ship maintenance facilities.

While the Soviets have a strong indigenous technology base that could support the development of much of their tactical weapons systems, they have maintained an ambitious program for obtaining Western technology in this area. In some cases these acquisitions satisfy deficiencies in Soviet technology such as in smart weapons

and electrooptics. More often this technology is used to speed up a development program or to improve upon Western designs.

Western equipment and technology has played a very important role in the advancement of Soviet microelectronic production capabilities and has helped the Soviets build a modern microelectronic industry which will be the critical basis for enhancing the sophistication of future Soviet military systems for decades.

The influence of Western grain and technology on Soviet agricultural performance had affected mainly livestock and fertilizers. Imports of Western grain have made it possible for the Soviets to maintain their livestock herds during a period of poor harvests. Western grain, especially corn, is also a more efficient feed than most domestic Soviet supplies. Western equipment and technology has been heavily involved in the rapid expansion of fertilizer production (still far from adequate) in the 1970's.

Over the last decade Western equipment and technology has contributed to the rapid expansion of Soviet gas production and the rapid expansion and maintenance of a high level of oil production. The contribution to the expansion of Soviet oil and gas exports has been particularly important. Major Western exports have included large diameter pipe, compressor stations, pipelayers, submersible pumps, gas-lift equipment, Christmas trees, and offshore rigs.

Imports of Western technology and equipment for metallurgy could help the Soviets alleviate some of their dependence on Western specialty steels and other products. The French are helping to build a steel complex in Novolipetsk and the Germans a plant in Kursk. Western technology is also being used in constructing an aluminum smelter in Sayansk in Siberia.

The Soviet computer industry lags behind the West in the number, variety, and technology of computers as well as in auxiliary equipment and supporting services. This has led to a substantial level of imports to meet priority needs. Although Western computers comprise only a small portion of the total Soviet and East Europe inventory, because of their superior performance and reliability, their proportional contribution is much greater than that of domestically produced equipment. The Soviets have imported large Western computers not only because they offer performance domestic models cannot match, but also because they include software that the Soviets have not developed or include training the U.S.S.R. cannot duplicate. Minicomputers have been imported for similar reasons and also because the diversity of Western systems makes it possible to meet a wide variety of specialized needs.

As a result of these attributes, Western computers enable the U.S.S.R. to accomplish tasks that would be very difficult if not impossible with domestic systems. For example, systems purchased for the 1980 Olympics allowed Aeroflot and Intourist to process a considerably greater number of tourists than would have been possible with domestically produced equipment. Large systems were also obtained for other high priority projects such as the Kama River Truck Plant and the Moscow regional air traffic control system.

DIVERSIONS TO THE MILITARY

Question 3c. How much Western dual-use equipment and technology have the Soviets diverted to their military? How vital is this technology to their military development?

Answer. The intelligence agencies can best provide specific answers to this question. In general, however, according to the CIA's unclassified report entitled "Soviet Acquisition of Western Technology," the Soviets and their Warsaw Pact allies have obtained "vast amounts of militarily significant Western technology and equipment through legal and illegal means."

This report also states that the Soviet need for Western designs, engineering approaches, and equipment are substantial and pervade almost every area of weapons technology and related manufacturing equipment. See attached Table 2 from the report.[4]

EAST EUROPE AS A CONDUIT TO THE U.S.S.R.

Question 3d. To what extent do the East European countries act as conduits for transfers of Western technology to the Soviet Union?

Answer. The CIA's unclassified report states that the Soviets make "extensive use of many of the East European intelligence services for the efforts in acquiring Western technology."

More specific figures of the transfer of Western technology through the East European countries can only be provided by intelligence agencies like the CIA.

DIFFERENTIATION

Question 3e. What is the Reagan Administration's policy on "differentiation" between Eastern Europe and the U.S.S.R. in its export control policy? Will this policy continue to be in effect for the next two years?

Answer. Under the Administration's policy of "differentiation" our trade and economic relations with each of the countries concerned are shaped by the individual economic and political characteristics each possess. In other words, we are prepared to offer relatively more favorable trading relations on the basis of mutual advantage to those nations which pursue relatively moderate domestic policies or which display a degree of independence in conduct of their foreign policy.

As far as the U.S.S.R. is concerned, the United States hopes that relations between our two countries will improve in a number of areas, including commercial relations, provided we do not sacrifice our strategic interests.

Our policy, then, with regard to the U.S.S.R. as well as toward Eastern Europe, is to balance our strategic and national security requirements against our trade and economic interests. We try to implement the policies set in the Export Administration Act in a manner that fulfills our security objectives while keeping to a minimum the cost on exports—and try to eliminate needless costs on exports when we find such costs to exist. In concrete terms, this

[4] The table referred to may be found in app. I.

means that we now consider license applications for the shipment of controlled goods to both the U.S.S.R. and Eastern Europe, and of technology on a case-by-case basis.

DUAL-USE TECHNOLOGY

Question 3f. How does the Administration identify which dual-use Western technologies are most sought after by the Soviet Union?

Answer. Upon assuming office the Reagan Administration directed the intelligence agencies to study and report on the issue of East-West technology transfer. These intelligence reports have assisted the Administration in determining what technology the Soviets need, what they have obtained, how such acquisition has helped the U.S.S.R. further its goal of military superiority, and what methods the U.S.S.R. is using to obtain the technology its needs.

ECONOMIC LEVERAGE

Question 3a. Is economic leverage effective in moderating Soviet behavior that runs counter to our perceived national interests or standards of conduct?

Answer. There is no clear-cut answer to this question. The U.S. has historically used export controls as a tool by which to register our disapproval of Soviet conduct in such matters as human rights violations, invasion of other countries (Afghanistan), and the Soviet role in the repression of the Polish people. The imposition of export controls is also intended to exert pressure on the Soviets to rescind such transgressions. While the results are not always readily apparent, we believe that, in the long run, our export controls on the U.S.S.R. are effective and do serve to put pressure on their economic system.

SECTION 4. AGRICULTURE

GRAIN TRADE

Question 4a. Since the grain embargo has been lifted and the U.S.-U.S.S.R. long-term grain agreement (LTA) has been extended for a second year, we seem to have returned to normal grain trade. Why is grain trade treated differently than other commercial relations?

Answer. The Administration lifted the partial grain embargo in April 1981 and has twice extended the U.S.-Soviet grain agreement, now in its seventh year. The U.S. position is that grain sales are intrinsically different from sales of strategic products or equipment and technology for the pipeline. Grain sales require the Soviets to expend needed foreign exchange (40% of all Soviet hard currency expenditures now go for food imports), while the pipeline will eventually earn billions of dollars annually for the Soviet economy. Grain is consumed within a short time and must be replaced continually and does not contribute directly to the development (sic) is sold for cash or short-term commercial credits, while European Governments subsidize long-term credits for the pipeline.

LONG-TERM GRAIN AGREEMENT

Question 4b. As this is likely to be the fourth successive poor crop year for the U.S.S.R., would this not have been a propitious time for us to renegotiate a better LTA?

Anwser. Although the 1982 Soviet grain crop—estimated at 180 million tons—is far below the plan target of 239 million tons, it is well above last year's disastrous harvest of 160 million tons or less. In addition, production of other crops as sugar beets and potatoes, have increased, improving the overall food balance. While the Soviet Union itself has now experienced four years of below-normal grain harvest, the world situation is one of burdensome supplies and slack demand. Non-U.S. suppliers also have plenty of grain to sell and prices are low. Under these "buyers' market" conditions, we would have little leverage in grain agreement negotiations. In addition, grain agreement negotiations were postponed as part of the Poland sanction package and no decision has been made to lift that sanction.

AGRICULTURAL TECHNOLOGY AND THE GRAIN AGREEMENT

Question 4c. Should agricultural technology be included in the grain agreement?

Answer. There is no basis for including agricultural technology in the grain agreement, which deal only with the supply and purchase of wheat and corn. Neither we nor the Soviets has any interest in broadening the grain agreement in this direction.

SUPERPHOSPHATE-AMMONIA

Question 4d. How should the superphosphate-ammonia deal be handled in the future, e.g., licensed if favorable to foreign policy?

Answer. We see no need for changing present trading arrangements with respect to these products; that is, trade restrictions are not necessary. If this situation should change in the future, any modification in how this trade is handled would depend on the legislation and general guidelines in effect whenever circumstances dictate a change.

AGRICULTURAL-TECHNOLOGY TRANSFER

Question 4e. What would be the agricultural prospects for the U.S.S.R. if a full agricultural-technology transfer were in place?

Answer. There are no restrictions on agricultural-technology transfer to the U.S.S.R., so presumably the Soviet Union is buying what it wants in the West. Should the Soviets decide to invest more heavily in agricultural technology, they could probably improve their production, but their chief agricultural problems are related to weather, geography and the inefficiencies of the centrally-planned economic system.

Question 4f. What could the Soviets accomplish, for example, in feed-grain livestock if they were as efficient as agribusiness in Iowa?

Answer. If the Soviets were as efficient as Iowans, of course, they probably would not need to import grain at all. However, given the centralized Soviet economic system and the lack of producer incen-

tives, it is impossible to imagine the Soviet agricultural system ever equaling our own in efficiency.

Question 4g. Is a Polish, Hungarian, or PRC agricultural-technology transfer strategy possible or prudent for the United States?

Answer. There is no reason why the U.S. would want to initiate an agricultural-technology transfer strategy for Poland, Hungary or the PRC. We see no need to either restrict or encourage their access to Western agricultural technology.

Section 5. Militarily Critical Technologies

Identification of militarily critical technologies

Question 5a. How should the U.S. identify militarily critical technologies?

Answer. To identify militarily critical technologies, the Department of Defense should assume primary responsibility and should organize a DOD-wide process to being together government and industry technical representatives to identify *and define* militarily critical technologies using the following basic criteria: (1) military significance of the technology and (2) adversary capabilities in the technology. A list of these militarily critical technologies should be published and updated annually. An organized review of the document by U.S. industry should take place. All of the above has taken place under the authority of the Export Administration Act and the third edition of the MCTL was produced on 1 October 1982.

Incorporating the militarily critical technologies list

Question 5b. What progress has the Administration made in incorporating that militarily critical technololgies list into our licensing process and that of COCOM?

Answer. A significant effort was completed in 1982 to incorporate the MCTL into U.S. proposals generated in the current COCOM List review effort. The MCTL program provided over 300 proposals in November 1981 to the inter-agency Technical Task Groups (TTG's) of the COCOM List Review to attempt to capture on the multilateral COCOM List the keystone equipment, keystone materials, etc., on the MCTL that were identified in the MCTL program as not presently captured on the control list. There is still a need to appropriately include the MCTL "arrays of know-how" into the U.S. export control regulations. DOD provided to the Department of Commerce and to industry on 10 September 1982 a recommended rewrite of the Technical Data Regulations (Section 379 of the Export Administration Regulations) to address the specific critical technologies. The draft calls for strict control of technology to all destinations, and substantial decontrol to end-products to COCOM nations.

Section 6. Political Relations and Technology Transfer

Political and security objectives

Question 6a. What are our "political and security" objectives as noted in the Ottawa summit communique?

Answer. In pertinent part, the communique says that the Summit Seven "concluded that consultations and, where appropriate, coordination are necessary to ensure that, in the field of East-West relations, our economic policies continue to be compatible with our political and security objectives." This linkage between overall economic and commercial matters, on the one hand, and political and security matters, on the other, was in itself a sizeable step forward, because some key allies understood such linkage to be a move away from "detente." Attention should be given to specific economic flows which could give unequal advantage to the East, specifically including Western exports of strategic goods and technology. A high-level COCOM meeting was subsequently held in Paris, as a direct result of President Reagan's presentation at Ottawa.

NORMALCY IN RELATIONS

Question 6b. How does the Reagan Administration define normalcy in U.S. relations with Communist countries?

Answer. The Administration distinguishes among the differing Communist governments, taking into consideration their foreign policy aims and also their domestic records in human rights, emigration, and other areas. For example, the Administration has made clear the actions of the Soviet Union in its occupation of Afghanistan, its role in the imposition of martial law in Poland, its support for the Vietnamese occupation of Kampuchea, its support for Cuban destabilizing activities in Africa and Latin America, and its denial of fundamental human rights to its own citizens are the cause of current strains in U.S.-Soviet relations.

SOVIET-CHINESE RELATIONS

Question 6c. How could improved Soviet-PRC relations affect U.S. technology transfer policy? What is the likelihood of such improvement?

Answer. We do not see signs that Sino-Soviet talks will lead to fundamental changes in the relationships between those countries. In any case, our relationship with China is pursued on its own merits, and we place China in a category by itself for export control purposes.

GRAIN EMBARGO AND OLYMPIC BOYCOTT

Question 6d. How did the Carter Administration's grain embargo and Olympic boycott help realize U.S. foreign policy objectives?

Answer. These measures demonstrated our opposition to the Soviet invasion of Afghanistan. So long as the use or threat of military force and violence remains a key instrument of Soviet foreign policy, our response will be to make that course costly to them in a real political and economic sense. Trade relations cannot proceed in isolation from the other elements of our relationship with the Soviets.

SECTION 7. TRADE SANCTIONS AND CONTROLS

EFFECTIVENESS OF SANCTIONS FOR FOREIGN POLICY PURPOSES

Question 7a. How effective are trade sanctions as a tool of foreign policy?

Answer. The effectiveness of trade sanctions for foreign policy purposes is complex and depends on the foreign policy goal being sought.

Every case of trade sanctions is necessarily different because it involves unique country actors, unique economic, political and military circumstances, and unique strategic considerations. There are several possible foreign policy objectives that may be sought when imposing sanctions in response to a provocation: (1) to inflict an economic price or diplomatic loss of face; (2) to signal another country that the resolve to resist, even under complex political circumstances and pressures, is not lacking; (3) to signal the strong desire on the part of one nation, or many, that the target country change its policies. The effectiveness of sanctions imposed as a signal to another country may not be discerned until years later because the sanctions may have *prevented* further action from occurring, rather than having caused a change in the offensive action or policy.

It is quite well understood that in order to inflict an economic price, trade sanctions must not be undermined by alternative suppliers. If they are (sometimes due to pressure brought by the target country), the effectiveness has to be measured in terms of the signal relayed to the target country, or in terms of some other goal. It is not always understood, however, that sanctions are very rarely, if ever, applied with narrow goals in mind. They always constitute an effort to achieve some or all of the possible foregoing policy goals mentioned above. Both the grain embargo and the pipeline sanctions, for example, were complex political signals as well as economic punishments. In the latter case, the foreign policy goals were primary, but security goals were also involved.

It is the gravity of the offensive action and the lack of alternative responses that determine the decision to use sanctions for foreign policy. Every case of sanctions incurs an economic price for the initiator. The initiator can never tell precisely how worthwhile the sacrifice will be before the sanctions are applied. The offensive action must be judged to be worth the price in political and foreign policy terms. Furthermore, the economic price incurred for the initiating countries, is often as complex to assess as the effectiveness of the sanctions. It will depend on the duration of the sanctions and other economic conditions surrounding the transactions and possible alternatives to the affected trade.

Lastly, if some suppliers disagree on the gravity of the offensive action and undermine the sanctions, the foreign policy signal may well have been effective in differentiating various countries' points of view toward the targeted country. This type of information is extremely important in times of international tension for determining the course of future policy. It is impossible to exactly assess the influence sanctions may have on political decision-making in all countries involved.

OIL AND GAS EQUIPMENT SANCTIONS

Question 8b. How effective were President Reagan's foreign policy controls on oil and gas equipment? Specifically, how effective have controls been on oil and gas equipment not related to gas transmission?

Answer. President Reagan's foreign policy controls on oil and gas equipment imposed significant costs on the Soviet Union and introduced a high degree of uncertainty into Soviet resource allocation decisions. The sanctions were in effect for nearly one year—from December 29, 1981 to November 13, 1982—during which the U.S.S.R. was able to obtain only a fraction of the equipment needed for its ambitious energy development programs. In many instances, as with the Siberian natural gas pipeline, the Soviets put up with delays rather than substitute other foreign or domestic equipment. Had the sanctions remained in place, major projects would have been delayed one to two years in some instances, and the Soviets would have been forced to allocate substantial sums to investment in new capacity or to use less reliable equipment in a high-prestige export project.

BENEFITS OF EXPORT CONTROLS

Question 7c. How are export controls beneficial to the United States and Western Europe? How are they detrimental?

Answer. National security export controls are an integral part of the military balance of power by which the allies maintain conventional and strategic parity with the Warsaw Pact forces. Their objective is to preserve the free world's small lead in advanced technologies and equipment which are applicable, directly and indirectly to weapons systems. These controls are beneficial in reducing the technological advancement of the Soviet military and thereby the defense budgets of the U.S. and its allies.

Export controls have also been beneficial in conveying specific foreign policy signals to potential adversaries, without the use of military means. They are applied in foreign policy to deter future aggressive actions by potential adversaries and to forcefully point out conduct in the world community that will be considered unacceptable.

SHORT-TERM OBJECTIVES OF EXPORT CONTROLS

Question 7d. What are the short-term objectives of export controls? How do controls affect short-term U.S. export policy as a whole?

Answer. The short-term objectives of export controls are the same as the long-term objectives. Those are to maintain a system of national security vigilance in peacetime, identifying exports that could be harmful to national security interests, and selectively prohibiting them or putting conditions on them.

Short-term U.S. export policy objectives are, in general, to promote U.S. competitiveness. Controls have very little effect on these objectives, although this is sometimes not the perception, especially in times of world wide recession and cutthroat competition.

All export controls confer maximum benefit when used in concert with other nations. Nonetheless, when other nations refuse to cooperate, exports controls imposed unilaterally sometimes relay an important foreign policy message to our allies and other alternate suppliers about our seriousness of purpose.

Export controls are detrimental from a commercial point of view. They reduce the potential export volume of the country. In the case of national security controls in the United States, we are referring to an average amount of exports equal to less than one percent of the total export volume to the world. This cost is considered a necessary burden of our security interests. Foreign policy controls are also detrimental to exports. Nevertheless, controls are usually the only remaining option for responding to a situation, and so are considered a necessary burden.

SOVIET HARD CURRENCY EARNINGS AND THE MILITARY BUILDUP

Question 7e. How do Soviet hard currency earnings relate to the Soviet military build-up? Should the United States attempt to limit Soviet hard currency earnings? Why or why not?

Answer. The Soviets require hard currency to purchase sophisticated technologies, which are dual-use in the West, but are more often devoted to the military in the Soviet Union. Large supplies of hard currency will enable the Soviet government to purchase more technology for the military and military support systems, while conserving domestic resources.

The United States should be concerned about major transfers of hard currency to the Soviet Government, especially if this hard currency is in repayment for critical raw materials on which the West is reliant. This combination of factors makes the Western nations vulnerable.

Nevertheless, U.S. ability to limit such earnings is modest, because they arise from sales to other countries.

The Administration does not condone a policy of economic warfare. Nevertheless, when major projects that could create undue Western dependency would also generate vast sums of hard currency for the Soviet Union, there is a need for caution.

CONTROLS ON EXPORTS TO EAST EUROPE

Question 7f. Do controls on East European countries effectively prevent or delay the transfer of Western technology to the U.S.S.R.?

Answer. Controls on exports of militarily critical technologies to the Eastern European countries can effectively delay the transfer of Western technology to the U.S.S.R. because these countries purchase much design and technological know-how that can be easily transferred. Such transfers help the Soviet Union consolidate its power over Eastern European countries. The United States does, however, follow a policy of differentiation in its control policies toward the Soviet Union and those East European governments that depart occasionally from the Soviet line. Some care is taken to avoid diversions of Western technologies from Eastern Europe to the U.S.S.R., even though this is difficult to do.

"NORMAL TRADE" WITH EAST EUROPE

Question 7g. How does the United States define "normal trade" with the Warsaw Pact nations?

Answer. U.S.-Soviet economic relations are dominated by the downturn in the overall relationship in recent years and particularly by the sanctions related to events in Afghanistan and Poland. Trade cannot be isolated from other elements of our relationship. Thus, we will not support trade which contributes to the Soviet military capability or enhances their strategic posture. Nor will we support credits the terms of which subsidize the Soviet economy. This is not, however, a policy of economic warfare against the U.S.S.R. We recognize the benefits from mutually advantageous trade as long as it is in harmony with our overall political and security objectives.

In accord with our policy on "differentiation" between East European countries, our trade policy with each is conducted on a country-by-country basis, taking into account our political and security interests.

PROSPECTS FOR CONTROLS ON OIL AND GAS EQUIPMENT

Question 7h. Does the Reagan Administration plan to use foreign policy criteria in its licensing of oil and gas equipment and technology in the future. How much longer will U.S. control on oil and gas last?

Answer. It is impossible to indicate whether or not foreign policy criteria will be used to further control oil and gas equipment in the future. Such a policy depends entirely upon the gravity and subject of the foreign policy decisions involved. The oil and gas equipment still being controlled was placed under control because of the invasion of Afghanistan. The conditions for modifying those controls have not been met. Furthermore, there could be security reasons for controlling exports of critical oil and gas equipment to the U.S.S.R.

REAGAN ADMINISTRATION AND CARTER ADMINISTRATION CONTROLS

Question 7i. How does the Reagan policy on oil and gas equipment differ from that of the Carter Administration?

Answer. Current unilateral controls on the export of U.S. oil and gas equipment to the U.S.S.R. do not differ from those in effect at the end of the Carter Administration. However, the Reagan Administration is seeking multilateral cooperation with these controls, whereas the Carter Administration did not.

SUCCESS OF GRAIN EMBARGO AND OLYMPIC BOYCOTT

Question 7j. How successful were the Carter Administration's grain embargo and Olympic boycott?

Answer. The Carter Administration's grain embargo was totally unexpected by Soviet leadership. The Soviets were unprepared for the political use of trade by a democracy, where forceful action is often prevented by the interplay of contending interest groups. The embargo succeeded in demonstrating the extent of U.S. opposition to Soviet expansionary action.

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The disruption in U.S. grain sales to the U.S.S.R. has, therefore, been the result of East-West friction over the Soviet invasion of Afghanistan. It is likely that the grain embargo and the Olympic boycott both have entered into Soviet thinking and have convinced them that it will take some time before the democracies completely accept Soviet piecemeal aggression in the world.

POLITICAL AND SECURITY OBJECTIVES

Question 7k. How do you define trade relations "compatible with our political and security objectives" as noted in the Ottawa communique?

Answer. The phrase "trade relations compatible with political and security objectives" means trade that does not significantly contribute to Soviet military capabilities and that does not misrepresent U.S. foreign policy. Broad security objectives mandate that improvement of Soviet military capabilities not be assisted by Western technologies. Foreign policy objectives include maintaining an international environment consistent with the protection of U.S. and free world interests.

STRATEGIC TRADE

Question 7l. How do you define "strategic trade"? How do we differentiate strategic technologies from others? Are certain technologies more strategic with relation to the Soviet economy than to the economies of Eastern Europe?

Answer. Strategic trade is the export of goods and technology which would make a significant contribution to the military potential of any other country or combination of countries which would prove detrimental to the national security of the United States. Strategic technologies are differentiated from others because of their military criticality and because of Soviet deficiencies. Security controls on exports to Eastern Europe cover the same items as security controls on exports to the U.S.S.R., although a modest differentiation in licensing policy is justifiable because of varying foreign and domestic policies of the individual Warsaw Pact countries and possible because some items are unlikely to be diverted.

SECTION 8. FINANCE

EFFECTS OF U.S. GOVERNMENT CREDITS ON TRADE WITH DEVELOPING COUNTRIES

Question 8a. Does the use of U.S. Government credits to finance trade with the East absorb financial resources that might be used to finance trade with the developing countries?

Answer. No, it does not. Funds are not allocated by U.S. credit agencies on a country-by-country or regional basis. Rather, export financing proposals are evaluated by these agencies on a case-by-case basis. These evaluations take into account, inter alia, such factors as the economic, financial and technical soundness of the project for which the financing is being sought and the economic and financial conditions in the country in which the project would be located.

In this connection, it is noteworthy that the U.S. Government is constrained by law from lending to the Soviet Union and all but two countries—Hungary and Romania—in Eastern Europe. The Jackson/Vanik Amendment to the Trade Act of 1974 expressly links the extension of official credits to non-market economy countries to the emigration policies of those countries. Pursuant to this statute, the U.S. Government does not lend or support private loans to Bulgaria, Czechoslovakia, the German Democratic Republic, and the Soviet Union. Poland has been excluded as part of the sanctions imposed by the United States and other Western governments following the Polish Government's imposition of martial law in December 1981.

POLICY OF RESTRICTING PREFERENTIAL CREDITS

Question 8b. Should the United States and Western countries follow a policy of restricting preferential credits?

Answer. Yes. The United States and Western countries should follow a policy of restricting preferential credits to finance commercial exports. These costs are needlessly wasteful. To the extent that these subsidies are matched by foreign competitors, nothing is achieved, even superficially, to alter the competitive trade balance.

Question 8c. Should this be done cooperatively or individually?

Answer. This should be and is a cooperative effort. Competition will gravitate toward the most concessionary terms offered; therefore, any effort to restrict preferential credits should be done as a collective effort. Twenty-two major trading countries are negotiating a reduction of export credit subsidies in the OECD International Export Credit Arrangement. The Arrangement sets the most liberal financing terms and conditions that an official export credit agency may offer; for example, the minimum downpayment, the maximum repayment term, the minimum interest rates, etc.

DEFINITION OF PREFERENTIAL CREDITS

Question 8d. What are preferential credits?

Answer. Preferential credits refer to any credit granted by or supported by an official export credit agency at terms more concessionary than a borrower would be able to obtain in the commercial market, without government support. Two traditional benefits of preferential credits are the degree of subsidy and the access to credit. The degree of interest rate subsidy can be measured either against the borrower's alternate source of financing, presumably a private market rate, or against the lending agency's cost of funds, in this case, presumably a government borrowing cost. The Arrangement has nearly eliminated interest rate subsidies. Given the debt burdens of many countries, the availability of financing is becoming increasingly important. Without official support (e.g., repayment guarantee) many borrowers would not have access to credit.

CAN PREFERENTIAL CREDITS BE RESTRICTED?

Question 8e. Can preferential credits be restricted?

Answer. Yes. The International Arrangement on Export Credits has already largely eliminated interest rate subsidies in official export financing.

Question 8f. Is a unified policy of restriction possible?

Answer. Yes. A unified policy is already in effect in the Arrangement context.

Section 9. Nuclear Power

Question 9a. What political, economic or other disadvantages could develop from steps to allow unrestricted proliferation of nuclear power? The answers to the above question will depend heavily on answers to the following subset of questions:

(a) What are the potential benefits to the United States from transferring nuclear power technology to the Soviet Union, Eastern Europe and China? What are the potential dangers? What are the potential benefits to the Soviet Union, Eastern Europe and China? Could these benefits increase the ability of the United States to influence the behavior of these countries?

(b) What is current U.S. policy on transfers of civil nuclear power technology to the USSR and China?

(c) What if the current policy of other nuclear suppliers on the transfer of nuclear power technology to Eastern nations?

(d) What effect would the transfer of civil nuclear power technology to the USSR and China have on the U.S. nuclear industry? What effect would such transfers have on the political relations between the U.S. and the Soviet Union and China?

(e) What political, military or other conditions would allow the United States to transfer nuclear power technology to the USSR and China? What steps could these respective nations take to bring about such conditions?

(f) Does the Soviet Union or China have policies to constrain the transfer of nuclear weapons?

Current U.S. Policy

Question 9b. Could less restricted transfers of civil nuclear power technology actually help in preventing nuclear proliferation?

Answer. A fundamental premise of U.S. international nuclear policy, which is widely shared by other nations, is that in order for nations to enjoy the potential benefits of peaceful nuclear activities, these activities must be undertaken under a regime of effective international controls. The purpose of the controls is to assure nations that the nuclear technology is not diverted for nuclear explosive uses. This shared view on the need for safeguards was one factor leading to the establishment of the International Atomic Energy Agency, and was reflected in the terms of the Non-Proliferation Treaty (NPT). Since the establishment of the IAEA and the NPT, the U.S. has been involved in continual efforts to improve the effectiveness of international safeguards in a manner compatible with global non-proliferation and nuclear interests.

We believe that any easing of the conditions of nuclear transfers, either technology or equipment, would run counter to U.S. non-proliferation efforts. To the extent that lessened controls would not

adequately safeguard nuclear transfers, peaceful nuclear technology would become less available. Neither of these results would be to anyone's advantage.

TECHNOLOGY TRANSFERS TO THE SOVIET UNION, EAST EUROPE, AND CHINA

Prospects for expanded nuclear cooperation with the Soviet Union are quite remote, since there would be few mutual benefits. It should be noted that the Soviet Union has never shown substantial interest in obtaining nuclear technology through cooperation with any Western countries. There are major U.S. legal and policy issues on whether it would even be feasible to conclude the necessary intergovernmental arrangements for such cooperation. Beyond this, to protect U.S. national security interests, even in the relatively non-sensitive area of commercial power reactors, careful controls would have to be applied by the U.S. to prevent the transfer of any U.S. light water reactor technology which would be of potential utility to the Soviets in military areas such as naval propulsion. It is not likely that U.S.-Soviet nuclear cooperation would significantly improve the ability of the U.S. to influence Soviet behavior in the areas of foreign, national security, energy or non-proliferation policy.

Should the People's Republic of China decide to look to the U.S. as a principal supplier of civil nuclear technology and equipment, the U.S. would receive substantive economic benefits. The Chinese also would benefit substantially from U.S. assistance to their civil nuclear program inasmuch as they would be able to take advantage of established technology, thus lessening the years necessary to develop a civilian nuclear infrastructure. On the other hand, the U.S. market in the PRC may be limited because of insufficient official capital resources for the PRC would be prepared to accept the requirements mandated by U.S. law and nonproliferation policy as conditions for peaceful nuclear cooperation.

There is little prospect for nuclear cooperation with Eastern European countries. The notable exceptions have been Yugoslavia, which purchased a reactor from a U.S. vendor, and Romania, which purchased a research reactor and associated fuel. The Soviet Union is the major nuclear supplier to the Eastern Bloc, having supplied light water reactors to Czechoslovakia, Bulgaria, and even Finland (latter *not* Soviet Bloc).

COOPERATION WITH THE SOVIET UNION AND CHINA

U.S. cooperation with the Soviet Union and the Peoples' Republic of China in the field of civil nuclear power has been limited and confined to exchanges or unclassified, non-sensitive information. In neither case does the U.S. have government-to-government bilateral agreements in effect. Under the terms of the Atomic Energy Act of 1954, as amended, such agreements are necessary for U.S. exports of nuclear fuels and reactor equipment to any country. Such agreements must contain all applicable statutory requirements and must be submitted to the Congress for its review.

Additionally, under the Atomic Energy Act, as implemented by DOE regulations, 10 CFT, Part 810, the transfer of any unclassified

nuclear technology to the Soviet Union, members of the Eastern Bloc, China and selected other countries would require the authorization of the Secretary of Energy, if the information is in unpublished form. Also, cooperation with either country is governed by COCOM procedures.

China is not a member of the London suppliers group, the IAEA, nor is it a signatory to the NPT. While China does require some conditions on its nuclear exports, these generally do not reflect international norms.

The Administration's non-proliferation policy grows from conviction that the spread of nuclear weapons is in no one's best interest. This concern is best addressed by reaching a consensus among like-minded states on the conditions of transfer of nuclear equipment and technology so that these transfers will not represent a proliferation risk. This policy approach, founded on cooperation and reliable nuclear supply relationships with U.S. allies and friends sharing our basic non-proliferation objectives, enhances our ability to enlist their active support in strengthening the global non-proliferation regime. We are working with other like-minded states to ensure that world-wide nuclear trade is subject to effective international controls.

Section 10. Arms Transfers

DIVERSIONS OF U.S. ARMS SALES TO SOVIET BLOC COUNTRIES

Question 10a. Are U.S. arms sales to third countries diverted to the Soviet Bloc countries?

Answer. The Department is unaware of an instance wherein defense articles and/or related technical data sold to another country have been subsequently diverted by the other country to the Soviet bloc.

Question 10b. How can the U.S. prevent such diversion?

Answer. The sale of defense articles to another country is conditioned upon, among other things, assurance to the United States Government by the other country that it will not transfer the defense articles and/or related technical data to any third country without prior written approval of the U.S. Government. A violation of such assurance would be vigorously pursued through diplomatic channels, and could result in the termination of the country's privilege to purchase defense articles and/or related technical data from the United States.

SOVIET ARMS SALES AS A SOURCE OF U.S. INTELLIGENCE

Question 10c. How do Soviet military sales, and economic and military aid serve as a source of U.S. intelligence. Are we using this source?

Answer. This question can best be answered by appropriate intelligence agencies, but as the question implies, such activity is an excellent source of U.S. intelligence and it is public knowledge that this source is actively pursued by the U.S. Government, e.g., the present discussion about use of Israeli intelligence following the conflict in Lebanon that involved Soviet military equipment.

SECTION 11. CONTROLS AND SCIENTIFIC COMMUNICATION

IMPACT OF NEW CONTROLS ON SCIENTIFIC COMMUNICATION

Question 11a. What impact will new national security controls, designed to limit undesired transfer to the U.S.S.R., have on desirable scientific and technical information flow and technology transfers?

Answer. It is hard to predict what the impact of new national security controls would be given the number of options being discussed and uncertainty about their scope. The recent National Academy of Sciences report entitled "Scientific Communication and National Security" by the panel on Scientific Communication and National Security of the Committee on Science, Engineering and Public Policy (the "Corson Report") does discuss the impact which the current controls have on scientific communication and discusses to some extent the impact which various suggested new controls may have. It also makes some observations and recommendations regarding scientific information and the national security. We believe this is a good starting point in answering the question and in deciding what various new security controls, if any, should be adopted.

NEED TO CONSIDER POTENTIAL DISADVANTAGES

Question 11b. What steps has the Administration taken to consider the potential disadvantages to scientific inquiry, academic freedom, and free trade implicit in moves to stem the outflow of national security-related scientific and technical information and technology?

Answer. The Administration is, of course, aware of and sensitive to the importance of free and open scientific communication among all scientists everywhere and of a free and open university system. More specifically with respect to Administration actions, the Corson Report, referred to above, was undertaken at the request of the Defense Department, and DOD and the NSF contributed to the funding of the report. Since the issuance of the report, and Administration has expressed its intent to carefully review the report and its recommendations. The Administration is now considering the appropriate mechanism for undertaking this review.

Also, the Department of Commerce has formed an interagency Task Force on Technical Data to get interested agencies' viewpoints and recommendations on the upcoming revision of the DOD technical data regulations (15 *CFR* Part 379).

Further, the Department of Defense has established a Defense-University Forum in which DOD and several major research universities meet regularly to talk about the common concerns, including problems of national security controls and the exchange of scientific information.

NEW EXECUTIVE ORDER

Question 11c. Please list the actions that the agencies of the Government are taking to implement the provisions of Executive Order 12356 that require classification of cryptology and of "scien-

tific, technological, or economic matters relating to the national security," and enumerate the criteria that guide researchers in determining if academic but Federally-funded research results should be classified. How do practices of implementation under this executive order differ from those of the preceding executive order on national security?

Answer. Plans are underway to revise the National Science Foundation Grants Procedure Manual to advise all NSF grantees of the requirements of the Executive Order. Additionally, with respect to grants that clearly may present the possibility of generating classified information, the grant instrument itself will contain appropriate provisions. Moreover, regarding cryptology the Foundation has gone beyond the requirements of the Executive Order and entered into a special arrangement with the National Security Agency.

We are aware of no special criteria that would be used to guide researchers in determining if academic but Federally-funded research results should be classified, but the NSF does assume a responsibility to assist them if research studies involve classified material.

CONTROLS ON TRANSFERS TO WESTERN COUNTRIES

Question 11d. Should controls be placed on transfers to Western countries to prevent inadvertent transfer to a third country?

Answer. To a great degree, the answer depends on the type of science, and on the scope and nature of the controls imposed. In some instances, e.g., nuclear weapon technology, a strong argument could be made for placing controls on transfer to all countries including Western countries; in many other cases, such a strong argument could not be developed.

TYPOLOGY OF CRITICALITY

Question 11e. Would threats to free inquiry be alleviated if a typology of "criticality" were developed for different kinds of scientific and technical information, like the critical technologies list used to administer the Export Administration Act?

Answer. The question seems to reflect a concern that the system be made more predictable and efficient. It is not clear what kind of "typology" might be designed. The Militarily Critical Technologies List (MCTL), might serve as a model, if properly addressed to researchers who would use it as a guide. However, this is clearly a question which will require further study in the ongoing review begun by the Administration.

SECTION 12. AMERICAN-SOVIET SCIENCE AND TECHNOLOGY AGREEMENTS

RESTRICTIONS OF SCIENCE AND TECHNOLOGY RELATIONS

Question 12a. How have U.S.-Soviet scientific and technical relations been restricted? What are the results of the U.S. review of the eight remaining U.S.-Soviet agreements for cooperation in science and technology that the Administration said it would conduct in 1982? Has the non-renewal of three agreements and the cutback

of remaining activities to 25 percent dimmed the momentum for cooperation so unalterably that there are slim, if any, prospects of restoring normal U.S.-Soviet patterns of trade and scientific and technological cooperation?

Answer. From early 1980, as a result of the sanctions imposed against the Soviet Union following their invasion of Afghanistan, through December 1981, U.S.-Soviet scientific and technical cooperative activities declined by approximately 75 percent. High level contacts and annual joint commission meetings were postponed indefinitely as well. Activities were continued which were of benefit to the United States and of humanitarian value—especially in the fields of health, safety and environmental protection.

After the imposition of martial law in Poland in December 1981, the Administration announced additional sanctions against the Soviet Union; among them was the decision to allow three science and technology agreements scheduled to expire in 1982 to lapse automatically. These were the Science and Technology, Energy, and Space Agreements. The expiration of these three agreements resulted in a further cut of roughly 25 percent below the post-Afghanistan level.

The executive branch departments and agencies involved in implementing the 11 bilateral S&T agreements, under the guidance of the Department of State, conducted the Administration-mandated review of exchange activities under the agreements and determined in general that all were of scientific benefit to the United States and should be continued. Those U.S.-U.S.S.R. projects and activities that were dependent on the existence of the S&T, energy and space agreements have essentially ceased. While the level of cooperative activities under the remaining eight agreements was cut back significantly, we intentionally did not destroy the framework of cooperation, in order to permit the restoration of cooperation should there be a significant improvement in the political environment and should it be determined that more extensive cooperation in these areas would be of scientific benefit to the United States.

EFFECTS ON INTELLIGENCE

Question 12b. It is alleged that the United States and the West benefitted from knowledge of the Soviet Union and Soviet science gained from these agreements. Has U.S. intelligence about the Soviet Union suffered as a result of the cutbacks?

Answer. The lead agencies involved in the cooperative activities with the Soviet Union believe that U.S. science has gained from the 11 U.S.-U.S.S.R. S&T agreements. It is difficult to determine whether U.S. intelligence about the Soviet Union has suffered as a result of the cutbacks, although it can be presumed that a lower level of activity might lead to a diminution in information received through these exchanges.

Our ability to follow scientific developments in the Soviet Union was impaired by suspension of activities under our Agreement. Throughout the history of the Agreement, one consistent comment by U.S. agricultural scientists who visited the Soviet Union was that the sheer magnitude of the Soviet effort in many areas makes

it probable that they will accomplish things of interest. The number of U.S. agricultural scientists visiting the Soviet Union each year dropped from about 26 to 2 or 3.

U.S. information about Soviet agricultural production was also set back. Previously, crop observation teams travelled twice each year to inspect Soviet winter and spring grain conditions. The on-site information gained by these teams could not be replaced by other means. In addition, an agreed schedule for exchange of statistical information had provided the United States with access to better and more timely information, through direct exchange, and because the Soviets had expanded publication of many statistical series called for in the schedule. Both the formal exchange and Soviet publication of statistics in other sources have been cut back.

ACTIVITIES UNDER COOPERATIVE AGREEMENTS

Question 12c. Describe activities conducted [thus far] under the cooperative agreements in 1982?

Answer. Activities approved during 1982 under the agreements are attached.[5]

Also in the agricultural area, in July 1982 a three-man U.S. delegation met in Moscow with the Soviets, and agreed to a limited program of cooperation. Since that meeting, two U.S. teams have travelled: a foreign grass germplasm collection team, which spent one month in the Soviet Union collecting seeds of grasses and legumes suitable for use on rangeland of the American Southwest; and a three-man spring grain team to observe Soviet growing conditions and crop prospects.

PROSPECTS FOR SCIENCE AND TECHNOLOGY SANCTIONS

Question 12d. How much longer will sanctions remain in place? Will agreements for cooperation be renegotiated if political conditions warrant?

Answer. The sanctions pertaining to science and technology exchange activities likely will remain in place as long as Soviet behavior in Afghanistan and Poland does not improve significantly. It is not possible to predict whether cooperation across the board will be renegotiated if political conditions improve. Such a decision will be based on the political value of increasing the level and scope of cooperation in these areas with the Soviet Union as well as scientific and budgetary considerations.

SPACE COOPERATION AGREEMENTS

Question 12e. The last of the space cooperation agreements that was signed under the umbrella agreement in May 1972 lapsed in May 1982 because of Soviet activities in Poland. Two minor space cooperation programs, however, will continue. One involves transponders and search and rescue, the other a biosatellite mission scheduled for early 1983. Do you intend to negotiate the renewal of any or all of the space cooperation agreements?

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[5] See app. I.

Answer. The Space project to develop satellite-aided search and rescue systems, although envisioned as a bilateral cooperative activity under the 1977 renewal of the space agreement, has become fundamentally a multilateral activity, involving the United States, Canada, France, and the United Kingdom on one side (SARSAT) and the U.S.S.R. (COSPAS) on the other side. Activities under this international humanitarian program were not affected by the expiration of the U.S.-U.S.S.R. Space Agreement and, hence, will continue.

Following the decision on non-renewal of the Space Agreement, NASA received interagency authorization to complete a project involving assistance to Soviet biomedical researchers in the preparation of experiments to be flown on the next Soviet biosatellite mission, then scheduled for late 1982. NASA was authorized to continue its involvement in the Soviet mission on the basis of agency-to-agency agreements with the Soviets stemming from 1978–81, which continued in force independent of the government-to-government agreement. Following completion of this activity (the launch has slipped to late 1983), NASA proposals for involvement in future biosatellite missions or other proposals for new U.S.-U.S.S.R. space cooperative activities would, of course, be subject to review on a case-by-case basis.

Although cooperative activities under the Agricultural Agreement were completely suspended for two years, the structure of the Agreement remains intact. A planning meeting held in July 1982 allowed for resumption of exchange activities on a limited scale, and we anticipate that additional activities will be implemented during the coming year. Cooperative contacts must be built up practically from zero after the two-year setback. But we see no reason to doubt that the pace of scientific and technical cooperation in agriculture could reach its earlier dimensions after current restrictions are removed. Even with those restrictions, our limited activities can begin the rebuilding process.

Section 13. American-Chinese Technology Transfer

Rationale for liberal transfers of technology to China

Question 13a. What is the Reagan Administration rationale for more liberal transfers of technology to the P.R.C. than the U.S.S.R. and Eastern Europe?

Answer. During the decade (1971–1981) drastic changes have occurred in China's domestic political and economic structure, and in its relations with other countries, especially the United States. Some of these changes have affected China's foreign trade, particularly its trade with the United States.

Since U.S.-China commercial relations were normalized in 1979, a much more favorable trade policy has developed. In February 1980, the U.S.-China Trade Agreement was ratified, thereby broadening the basis of commercial relations and granting China MFN tariff status. Shortly after, the P.R.C. was placed in country group "P" for export licensing purposes, and in June 1981, the President announced a new licensing policy. The continued expansion of the

trade depends mainly on two aspects of U.S. trade policy, export control and import regulations.

The goal of this Administration is to normalize and liberalize U.S.-China relations. It wants the Chinese nation to build a strong and secure nation that can contribute to the peace and stability in Asia, and the United States seeks their support in combating global problems such as terrorism and hegemonism, and in the search for solutions to common issues, such as energy development, arms control, and environmental pollution.

EXPORT CONTROLS

Question 13b. Is the Administration's current treatment of the P.R.C. now the same as its treatment of other friendly nonaligned nations (e.g., Indonesia) in its export policy?

Answer. Since 1980, U.S. export control policy toward China has undergone periodic review and liberalization. In April 1980, a new country group "P" was established for China. This removed China from the more restrictive country group "Y", which includes the U.S.S.R. and certain dual-use items to China. In June 1981, the President announced a presumption of approval of export licenses for products with technical levels twice those previously approved for China. In December 1981, guidelines were published implementing that new policy. These guidelines included advisory notes which listed levels of about 30 items which would likely be issued export licenses for sale to China. These include certain computers, optical equipment, microprocessors, and data communications equipment.

Under this policy there are restrictions on exports that contribute significantly to special mission areas, including nuclear weapons and delivery systems, intelligence gathering and electronic warfare equipment and antisubmarine warfare equipment.

The policy, however, is constantly undergoing review. The Administration is considering several options on further revisions of the licensing policy towards the P.R.C.

EXAMPLES OF TECHNOLOGY THAT MAY BE TRANSFERRED

Question 13c. What are some concrete examples of technology that may be transferred to the P.R.C., but not the U.S.S.R. or East European countries? What are some examples of technology that may not be transferred to the P.R.C., but that may be transferred to our closer friends and allies?

Answer. Commodities/technologies which have been approved to P.R.C. but would not be to Eastern Europe or the Soviet Union include a large computer network of 20 computers for the Census Bureau, and large-scale computers for processing oil exploration data.

Technology to provide Chinese with one of the most modern telecomunication systems in the world was approved.

Computer numerical control (CNC) units with four-axes capability have been approved for China with and without machine tools. Only two-axes CNC units without machine tools and three-axes CNC units with machine tools have been approved for Eastern Europe and the U.S.S.R.

Other examples include microcomputers utilizing 16 bit microprocessors, and microprocessor development systems, and PROM programmers; fourier transform based acoustic signal analyzers (vibration and sound); and general test equipment including wide band oscilloscopes above 200 MHz, microwave frequency counters above 1 GHz, synthesized signal generators, and radio frequency spectrum analyzers above 1 GHz.

Additionally, technical data which has been approved for China and would not be approved for Eastern Europe or the U.S.S.R. includes:

Printed circuit board assembly;
Seismic data;
Aircraft production;
Pharmaceuticals;
Remote sensing, and
Computer software.

An example of what may not be transferred to the PRC but may be to our closer friends and allies would be certain semi-conductor manufacturing equipment.

Section 14. American-Chinese Scientific and Technical Relations

Growth of scientific and technical relations

Question 14a. How have scientific and technical relations with the People's Republic of China changed?

Answer. Science and technology relations between the U.S. and China grew slowly and remained at a modest level prior to the normalization of relations in January 1979. Since then relations have expanded rapidly, both on a government-to-government basis through private channels. This growth in science and technology has been a conscious reflection of a U.S. policy that regards China as a friendly, non-allied country with which we share many important interests.

The basis of official cooperation is the U.S.-P.R.C. agreement on Cooperation in Science and Technology, signed by President Carter and Vice Premier Deng Xiaoping in January 1979. This was one of three agreements that the two leaders signed at that time: the other two concerned cultural exchanges and consular relations. These agreements have helped form the substance necessary to a sound, long-term relationship between the two countries.

The two sides immediately brought under the Science and Technology Agreement the three Understandings covering cooperation in student/scholar exchange, agriculture, and space technology which has been concluded before normalization (in October, November, and December 1978 respectively). Since then the two sides have concluded technical protocols on cooperation in 14 other fields. A list of all 17 implementing accords to the Agreement is attached.[6]

A Joint Commission on S & T Cooperation directs and coordinates the overall program of official exchanges in science and tech-

[6] The List of Technical Protocols may be found in app. I.

nology. The Commission is co-chaired by the President's Science Advisor and Director of the Office of Science and Technology Policy (OSTP), Dr. George Keyworth, and by State Councillor (formerly Vice Premier) Fang Yi. OSTP serves as the executive agent for the Agreement on the U.S. side. The Department of State's Office of Cooperative Science and Technology Program in the Bureau of Oceans and International Environment and Scientific Affairs (OES) acts as the U.S. executive secretariat. The executive agent on the Chinese side is the State Science and Technology Commission (SSTC). The individual technical protocols are run by the relevant technical/program agencies of the two governments. The Commission meets annually with the next meeting scheduled for May 9 in Beijing.

Much of the initial activity under the technical protocols have involved orientation visits, the identification of appropriate counterpart in institutions and scientists, and the planning of cooperative work. However, work is well along under the earlier agreements, particularly in such fields as agriculture, marine sciences, public health and medicine, and earthquake studies. A detailed discussion of agency program through late 1981 appears in pages 228–251 of "Science, Technology and American Diplomacy 1982: Third Annual Report Submitted to the Congress by the President Pursuant to Section 503(b) of Title V of Public Law 95–426," issued by the House Committee on Science and Technology in June 1982. A copy of those pages is attached.[7]

The Chinese attached high importance to science and technology cooperation with the U.S. They view the West and Japan as the sources for technology to further China's development and advance the "Four Modernizations." They see the U.S. as the only country with the scientific base and resources large enough to meet China's requirements on a broad front, especially its desperate need to train technical personnel. Under the student/scholar exchange program, which is part of the S&T Agreement, some 6,000 Chinese have come to study and do research at various U.S. institutions since 1979. Most of these scholars concentrate in the scientific and technical fields. (It should be noted that although these exchanges take place under the aegis of the S&T Agreement, the Chinese make the placement and funding arrangements directly with U.S. institutions, without USG involvement or financial support.) A similar number of Chinese have come under private sponsorship (mostly through the help of relatives in the U.S.).

The Chinese view the official program of S&T cooperation as only one part of China's overall S&T connections with the U.S. Other parts involve myriad links and relationships between Chinese agencies or institutes and American universities, scientific societies private organizations, and companies. These relationships have multiplied in the past few years. For example, more than 75 U.S. colleges and universities have at least one formal cooperation or exchange agreement with an institution in China; many of those schools had agreements with more than one Chinese institution.

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[7] The material referred to may be found in app. I.

Many Chinese organizations and institutions have formal relationships with other private American counterparts. The Memorandum of Understanding between the U.S. National Academy of Sciences and the Chinese Academy of Sciences (January 1980), and the agreement for Cooperation between American Nuclear Society and the Chinese Nuclear Society (October 1980) offer two examples. Exchanges and visits of various types are conducted between Chinese counterparts and such organizations as the American Vacuum Society, the National Conference of Standards Laboratories, and the American Institute of Chemical Engineers. American private and public museums, including the Smithsonian Institution, conduct joint research, exchanges and visits with Chinese organizations.

These activities and relationships have grown on their own and, on the U.S. side, have no formal connection to official exchanges under bilateral agreements. On the other hand, the distinction between "official" and "private" exchanges is somewhat blurred in Chinese eyes. Among others the sale or transfer of equipment and technical data to China are subject to U.S. Government export licensing requirements, a process that gives the whole process of technological cooperation, whether under private or government auspices, an official air to the Chinese.

FUTURE PROSPECTS

Question 14b. U.S. scientific and technical interchange with the People's Republic of China occurs via commercial technology transfers, government-to-government formal agreements for cooperation, and government-sanctioned, but nongovernmental, academic exchanges. The success of the relationship, and expectations for it, depends on financial support (which is growing more scarce on both sides), on threats to national security posed by the transfer of information, technology and exchanges of people (closer surveillance is being applied to such exchanges), and on political events, such as Chinese reactions to U.S. support of Taiwan, as well on a coherent, U.S. policy definition of its relationship with China. Some observers say that scientific and technical interchange between the two countries consistent with Chinese drives for modernization, is at the core of the current relationship between the two countries, and that to jeopardize the science and technology relationship is to destroy the heart of the larger nexus. Others say the United States should support the Chinese drive for modernization at all costs in order to open additional markets for American products and to maintain a U.S. presence in this strategic area. In view of these considerations, what are the Administration's short- and long-term plans for the relationship with China?

Answer. The U.S. derives significant benefits from science and technology exchanges with China:

(a) Politically, the exchanges have added needed substance to the normalization process by fostering an expanding network of institutional and personal relationships between the S&T establishments of the two countries. They have also helped China advance in economically relevant areas of science and

technology and thereby serve U.S. interest in participation in Chinese development.

(b) The U.S. benefits commercially from Chinese purchases of U.S. technology and equipment in a host of areas. In the official exchanges there are commercial benefits from Chinese purchases of U.S. equipment under the S&T Agreement and from the prospect of large contracts arising from feasibility studies under the Protocol of Hydroelectric Power Development.

(c) Scientific benefits accrue from investigations in cooperation with Chinese specialists in China. The benefits mostly derive from special conditions in China, such as a high level of seismicity conditions which permits efficient study of earthquake prediction, or the large, geographically stable population which makes possible epidemiological studies of great interest to the U.S. medical community.

(d) Scientific manpower becomes available to the U.S. scientific community as Chinese exchange scholars contribute to research at U.S. institutions. U.S. scientists also receive or share the results of Chinese work in coordinated research programs, thus obviating the need to duplicate that work on their own.

In looking to the future, Administration officials have stressed that it is a fundamental interest of the United States to preserve and advance relations with China. That relationship has made great strides since normalization, and the Administration will seek continued progress in the future. Relations in science and technology—broadly defined—are an essential part of the relationship and are governed by the same considerations. Indeed, the President's Science Advisor has said that the S&T exchanges with China command high priority in our bilateral science and technology relations and will continue to receive his strongest support and interest. The complex of interests served on both sides—in science and technology as well as in other areas—is too tightly woven to identify one thread which bears the whole weight of the relationship. Benefits of all kinds are considered important in calculating the overall benefit of science and technology with the P.R.C.

As noted above the Administration will continue to seek expanded and strengthened relations with the P.R.C., both as a near- and long-term objective. This aim is to achieve steady growth consistent with U.S. political, economic, and national security interests. This will be true of relations in science and technology as it is in other aspects of the relationship.

In the Joint S&T Commission meeting in May, the U.S. side looks forward to signing new protocols for cooperation in such areas as nuclear fusion, biomedical research, and conservation, and to continue the present measured pace of growth in existing exchanges.

SECTION 15. U.S. GOVERNMENT ORGANIZATION FOR TECHNOLOGY TRANSFER CONTROL

EFFECTIVENESS OF GOVERNMENT ORGANIZATION

Question 15a. How do you assess the effectiveness of existing organizational arrangements in the executive branch, the Congress and the U.S. business and scientific community in regulating technology transfers from the United States?

Answer. The interagency licensing system has been revitalized by this Administration. In the revitalized interagency process, all the principal advisory agencies under the Export Administration Act of 1979, and other agencies with an interest in export control issues now participate actively. The interagency groups include the Operating Committee, the Advisory Committee on Export Policy, and the Export Administration Review Board which is chaired by the Secretary of Commerce.

In addition, within the past year, new Senior Interagency Groups (SIGs) have played an increasingly active role in shaping East/West trade policy, thus permitting greater scope for interagency involvement and cooperation.

We have also been working closely with U.S. business and the scientific community. The scientific community is concerned that the Administration's efforts to stem the transfer of sensitive technology to potential adversaries will stifle scientific exchange to the detriment of U.S. scientific development and will impose unworkable constraints on day-by-day activities in Universities. Prompted in large part by the concerns of the scientific/academic community, the Department of Commerce is clarifying our technical data regulations. We are currently reviewing these regulations with the Departments of Defense, Justice, and State, to assure that the balance between Constitutional freedoms and legitimate national security interest is maintained. The academic community, the National Science Foundation, and the National Academy of Sciences are also helping us in this review.

Finally, we have instituted a series of lectures to help the exporting business community, Commerce district office employees, and other enforcement agencies understand Commerce's Export Administration Regulations. We are also engaged in a program of public presentations designed to actively encourage the private sector to voluntarily comply with Commerce's export regulations. This effort, which is in conjunction with the lecture series, is vital to improving private sector understanding of the export control program, and will reduce inadvertent, unlicensed exports of controlled products and technology.

By all these actions the Administration believes we are effectively following the Congressional mandate in the Export Administration Act to "restrict the export of goods and technology which would make a significant contribution to the military potential of any other country or combination of countries which would prove detrimental to the national security of the United States".

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ADEQUACY OF INTELLIGENCE

Question 15b. Is there adequacy of intelligence on foreign misuse of U.S. technology? In the broad view of technology transfer, the difficulty of determining actual misuse, and higher priority demand on intelligence capabilities are limiting factors; nonetheless, does U.S. intelligence now focus its attention on requiring information relevant to assessing the possible misuse of critical U.S. technology and has it been successful in identifying significant cases of misuse in support of export control efforts?

Answer. The intelligence communities can best describe the resources they devote to this area, from which a qualitative judgment of adequacy can be determined.

It should be clarified, however, that the Department of Commerce relies on many sources other than the intelligence community for information pertaining to foreign misuse of U.S. technology. Some of our major sources include U.S. businesses, and U.S. Embassy personnel abroad. In short, we utilize all information and intelligence sources available to us.

On a more preventive note, this Administration is currently involved, on a multilateral basis, in marshalling the support and commitment of our allies to prevent further technology leakage of the Soviet Union by Western industrial concerns and by U.S. subsidiaries and licensees operating abroad. We are also upgrading with our COCOM partners national and multilateral control enforcement efforts. Improvements being instituted include information sharing and other forms of cooperation.

CONTROL OF EAST EUROPEAN OFFICIALS

Question 15c. Would more control of the number and character of Eastern diplomats and special delegations reduce industrial espionage?

Answer. Given the nature of our open Western security, the open character of scientific conferences, legislation stressing availability of official documents, and the number of non-diplomatic or non-delegation entities available to the Soviets, we do not think increased control of this kind would be advisable or effective in reducing industrial espionage. This is not to say that we should not continue to control the entry of special delegations from communist countries. The number of Eastern diplomats in the U.S. must be viewed in the context of equivalent levels of U.S. diplomats in the Eastern countries. We do not wish to affect adversely and unnecessarily place numbers of our delegations to their countries in jeopardy.

WESTERN COORDINATION OF CONTROLS—COCOM

Question 15d. Is there adequacy of Western coordination of technology transfer controls? In the past the United States has recognized that unilateral controls on technology transfers, including exports of advanced products, would be largely ineffective. For this reason, for almost three decades, the United States has cooperated in COCOM with other NATO countries and Japan in coordinating controls on exports to Communist countries. Has this coordination been reasonably effective? In any event, is there a realistic alterna-

tive course of action open to us? Specifically, can effectiveness of controls be improved by refining the list of products and technologies subject to control?

Answer. Upon assuming office, this Administration immediately initiated an in-depth examination of the effectiveness of COCOM. We concluded that, although COCOM had stopped many sensitive transfers that would have contributed to the military capabilities of our adversaries, the organization is still far from being totally effective.

Major reasons identified were: (1) the limited scope and concept of the COCOM control list; (2) weakness in multi-lateral enforcement; (3) widespread availability from non-COCOM countries; and (4) inconsistencies in licensing procedures and interpretations of the international control list among COCOM members.

Following identification of these problems, President Reagan, in July 1981 at the Ottawa Summit, personally appealed to the leaders of Europe, Canada, and Japan to join with the U.S. in tightening controls on high technology transfers to the U.S.S.R. and Bloc countries. As a result of this appeal, a high level COCOM meeting—the first in twenty-five years—was held in January 1982.

Since that meeting, the U.S. has focused on making the voluntary COCOM organization a more effective mechanism for controlling Western transfers of keystone equipment, materials and technical data to Soviet defense priority industries. This effort is centered on the 1982–83 COCOM List Review, where we are seeking to tighten controls on higher-level, sensitive items while decontrolling non-sensitive, lower technology items. The work the U.S. is doing in refining the Militarily Critical Technologies List (MCTL) has provided a firm foundation for U.S. efforts in these negotiations.

As you are aware, the MCTL started out as a huge, comprehensive listing of commodities and technologies reaching far beyond those normally thought of as militarily critical. This prompted the necessity for the current effort to refine the list to only those items deemed truly militarily critical. We have applied the knowledge gained from streamlining the MCTL to the ongoing COCOM List Review. We believe that a streamlined control list will considerably enhance the effectiveness of controls.

ADEQUACY OF INTERAGENCY COORDINATION

Question 15e. Is there adequacy of interagency coordination of controls? The Department of State administers export controls on munitions list items; the Department of Commerce licenses general purpose items (including dual-use items); and the Nuclear Regulatory Commission licenses exports of nuclear material, reactors, and certain components, and the Department of Energy authorizes transfer of nuclear technology and technical information. Each of the issuing agencies receives advice from other interested agencies, including the Departments of State and Defense. There may, of course, be disagreements about how significant any security implications are. Are the procedures established for resolving such issues at a high level adequate? The Nuclear Non-Proliferation Act mandates procedures, including an interagency reviewing mechanism. Export licenses are transmitted from the licensing agency to

the other agencies participating in the reviewing process (State, Defense, ACDA, Commerce, Energy, and NRC). Are their procedures adequate?

Answer. As outlined in our answer to question 5(a), the interagency review and licensing system has been revitalized and is functioning smoothly. Active use has been made of the working-level interagency Operating Committee for resolution of interagency differences. Cases not resolved at that level are escalated to the Sub-ACEP (Deputy Assistant Secretary level). From there cases are escalated to the ACEP (Assistant Secretary level); then to the EARB (Cabinet level) and, ultimately, to the President for resolution.

With respect to nuclear non-proliferation controls specifically, there is a well coordinated review system in place. The Department of Commerce solicits the review of all nuclear cases by the Department of Energy, which sends an officer weekly to review the applications. A certain number of these cases are sent to DOE for more detailed study. Such study may include referral to the weapons laboratories and other DOE facilities throughout the country.

Cases that raise policy or technical problems that DOE determines should not be handled unilaterally, or ones where Commerce does not agree with Energy's recommendation are sent to the Subgroup on Nuclear Export Coordination (SNEC). The SNEC provides the necessary consultation for Commerce's cases as well as for nuclear exports licensed by other agencies.

Overall, the review procedures for Commerce's cases are very thorough, and interagency coordination of controls is functioning well and along the lines mandated by the Export Administration Act of 1979.

CRITERIA FOR CONTROLLING EXPORTS

Question 15f. Are the criteria for controlling exports sufficiently known in the private sector to U.S. business and farm interests to permit appropriate planning and investment? Is the mechanism of control timely and certain enough not to unduly burden U.S. commercial interest? Is there adequate means to compensate business interests damaged by export control actions beyond their knowledge and influence, e.g., compensation for restrictions based on foreign policy criteria?

Answer. The criteria for controlling exports for national security reasons are well known and have not changed appreciably in recent years. The principal changes have been in our foreign policy controls. These are published in the Federal Register and Export Administration Bulletins. Consultation with industry before imposing these controls, should permit U.S. business interests time for appropriate planning and investment. Nevertheless, conditions that give rise to foreign policy controls are volatile and are subject to changes without much notice. There are no current means to compensate business interests damaged by export control actions. Such compensation would be tantamount to a subsidy and is regarded as the wrong approach toward alleviating the commercial burden of export controls for foreign policy purposes.

APPENDIX I. MATERIAL SUBMITTED BY THE ADMINISTRATION

1. SELECTED SOVIET AND EAST EUROPEAN LEGAL AND ILLEGAL ACQUISITIONS FROM THE WEST AFFECTING KEY AREAS OF SOVIET MILITARY TECHNOLOGY

Key Technology Area	Notable Success
Computer	Purchases and acquisitions of complete systems designs, concepts, hardware and software, including a wide variety of Western general purpose computers and minicomputers, for military applications.
Microelectronics	Complete industrial processes and semiconductor manufacturing equipment capable of meeting all Soviet military requirements, if acquisitions were combined.
Signal Processing	Acquisitions of processing equipment and know-how.
Manufacturing	Acquisitions of automated and precision manufacturing equipment: for electronics, materials, and optical and future laser weapons technology: acquisition of information on manufacturing technology related to weapons, ammunition, and aircraft parts including turbine blades, computers, and electronic components: acquisition of machine tools for cutting large gears for ship propulsion systems.
Communications	Acquisitions of low-power, low-noise, high-sensitivity receivers.
Lasers	Acquisition of optical, pulsed power source, and other laser-related components, including special optical mirrors and mirror technology suitable for future laser weapons.
Guidance and Navigation.	Acquisitions of marine and other navigation receivers, advanced inertial-guidance components, including miniature and laser gyros: acquisitions of missile guidance subsystems: acquisitions of precision machinery for ball bearing production for missile and other applications: acquisition of missile test range instrumentation systems and documentation and precision cinetheodolities for collecting data critical to postflight ballistic missile analysis.
Structural materials	Purchases and acquisitions of Western titanium alloys, welding equipment, and furnaces for producing titanium plate of large size applicable to submarine construction.
Propulsion	Missile technology: some ground propulsion technology adiments, turbines, and rotaries: purchases and acquisitions of advanced jet engine fabrication technology and jet: engine design information.
Acoustical Sensors	Acquisition of underwater navigation and direction-finding equipment.
Electro-optical Sensors.	Acquisition of information on satellite technology, laser range-finders, and underwater low-light-level television cameras and systems for remote operation.
Radars	Acquisitions and exploitations of air defense radars and antenna design for missile systems.

Source: CIA, *Soviet Acquisition of Western Technology.*

2. LIST OF OFFICIAL AMERICAN-SOVIET SCIENCE AND TECHNOLOGY EXCHANGES DURING 1982

Activity	Action
JANUARY 12, 1982	
Science and Technology Agreement. (01.0303): Electrometallurgy and Material Program. Electron Beam Evaporation—four Soviets to United States in April, 1982.	Approved.
Health Agreement (03.0103): Myocardial Metabolism—two Soviets to Boston, Bethesda and Houston in January 1982, for 60 days. (Moscow 115).	Approved.
Health Agreement (03.0503): Treatment RA of Arthritis—two Soviets to New Orleans, Memphis, Baltimore, and Washington in January for nine days. (Moscow 170).	Approved.
Health Agreement (03.03): Chemotherapy of Tumors—two Soviets to Buffalo, NY, in January for 30 days. (Moscow 295).	Approved.
Environment Agreement (02.09–11): Field Investigations of Earthquake Prediction. Three United States scientists to the USSR in February for three weeks.	Approved.
JANUARY 19, 1982	
Space Agreement (04.07): Two United States specialists to the USSR in February 1982, for two weeks to conduct ground tests of COSPAS equipment under the COSPAR/SARSAT Search and Resuce Project. (State 7314).	Approved.
Atomic Energy Agreement (07.01): Fundamental Properties of Matter. One Soviet to Stanford Linear Accelerator Center, Stanford, California, for 21 days in February 1982. (Moscow 319).	Approved.
Atomic Energy Agreement (07.01): Fundamental Properties of Matter. Five Soviets (plus three dependents) to Batavia, Illinois for six months (three Soviets) or one year (two Soviets plus three dependents). (Moscow 448).	Approved.
FEBRUARY 1, 1982	
Science and Technology Agreement (01.14): NBS-ASUSSR Agreement. One Soviet to Washington, Boston, and Chicago under NBS/ASUSSR Agreement. (Moscow 366).	Approved.
Atomic Energy Agreement (07.01): 14 Soviets to Stanford, CA, in February 1982, for 14 days to attend Second International Conference on Instrumentation for Colliding Beam Physics. (Moscow 768).	Approved.
Environmental Agreement (02.03–21): 8–10 Americans to Leningrad and Tallin in October 1982, for symposium on Interaction between Forest Ecosystems and Pollutants.	Approved.
Atomic Energy Agreement (07.01): Two Soviets to Stanford, CA, for 10 days in February 1982, in the area of Fundamental Properties of Matter. (Moscow 1145).	Approved.
FEBRUARY 16, 1982	
Environmental Agreement (02.05–61): Marine Mammals. Two Soviet specialists to participate in a one-month West Coast research cruise abroad the NOAA vessel "David Starr Jordan." Scheduled for May 5–June 7, 1982, to investigate stock specific vocalization patterns of California cetaceans.	Approved.
Environmental Agreement (02.05–7191): Threatened and Endangered Plants. Two American botanists to botanical gardens in Moscow, Leningrad and Caucasus Mountains for three weeks in mid-April 1982, to continue research begun in 1981 as well as to start work on a major joint manual on characteristics of flora indigenous to the USSR.	Approved.

2. LIST OF OFFICIAL AMERICAN-SOVIET SCIENCE AND TECHNOLOGY EXCHANGES DURING 1982—Continued

Activity	Action
Environmental Agreement (02.05–81): Ichthyology and Aquaculture. Reciprocal exchange of US and Soviet fisheries biologists for a four-week period in May-June 1982. Two American specialists to conduct research on pond fisheries and fish genetics at Soviet laboratories in Dmitrov, Astrakhan and Moscow; two Soviet scientists to work in the areas of fish breeding and virology at US Fish and Wildlife Service research centers in West Virginia and Alabama.	Approved.
Transportation Agreement (05.0403): Civil Aviation—Microwave Landing System Subgroup. Visit by US leader of MLS subgroup and three others to Moscow March 29–April 2, for MLS meeting.	Approved.
Environmental Agreement (02.08–11): One US Scientist to the USSR for one month in May/June 1982, in the area of climate modeling. It should be emphasized that the paper is to focus on environmental protection considerations, not technological aspects, of pipeline construction and engineering.	Approved.
Science and Technology Agreement (01.13/01.15): Five Americans to Moscow for 7 days under Corrosion and Heat and Mass Transfer to attend a joint symposium in Two-Phase Systems (Steam and Water) under Conditions of Heat and Mass Transfer. This symposium will address the worldwide problem of equipment reliability that is directly traceable to chemical impurities/additives that can cause corrosion of important components, boilers, steam generators and steam turbines. This is a very severe problem in the US and the Soviets are also experiencing this problem. The Soviets use a "neutral oxygen" chemical control system as a remedial action which they claim has been effective. In addition to discussing this process, the Americans wish to obtain first hand access to Soviet studies in this area, published for domestic distribution and not readily accessible. Knowledge gained from this symposium will result in significant practical implications in terms of R&D and "down time" in the energy industry.	Approved.
Science and Technology Agreement (01.14): Two Americans to Moscow for 14 days in May under the National Bureau of Standards and USSR Academy of Sciences MOU. These scientists will carry out detailed work on a new generation of Thermodynamic Tables which will be more flexible in terms of input and ease of production than current tables. The Soviets and the Americans who are drawing up these tables are very close together on production tables of this type. If agreement can be reached, duplication of these tables can be stopped. It is anticipated that an automated data base from IVTANTERMO can be obtained which will enhance the capabilities of NBS's Chemical Thermodynamic Data Center and increase the exchangeability of data between the three large centers IVTAN, NBS and JANAF.	Approved.
Science and Technology Agreement (01.15): One American to Moscow, Minsk, and Leningrad for 14 days in April under Heat and Mass Transfer. This visit will permit the examination of work done in the area of helically coiled tubes, which has attractive applications to fast breeder nuclear reactor power plants. Discussion and research in additional areas dealing with power plant heat exchangers including nulcear and non-nuclear systems and large scale heat exchangers for power plant applications will be possible. Such testing and research is not being done in the US, is extremely expensive and is difficult to perform. Knowledge gained of Soviet progress in this area will be extremely useful.	Approved.*
Environment Agreement (02.08–12): Effects if Pollution of the Atmosphere on Climate: One US specialist to the USSR in May 1982, for seven days to discuss the use of NDIR and to collaborate on the methodology of CO_2 sampling and analysis.	Approved.

2. LIST OF OFFICIAL AMERICAN-SOVIET SCIENCE AND TECHNOLOGY EXCHANGES DURING 1982—Continued

Activity	Action
FEBRUARY 22, 1982	
Environment Agreement (02.02–10): Water Quality/Aquatic Ecosystems: Six Soviets to the US (Hilton Head, SC and Columbia, MO) in September 1982, for two weeks. They will attend the annual meeting of the American Fisheries Society where they will conduct a symposium with US scientists. At Columbia, MO, they will visit fisheries laboratories. Jointly sponsored by EPA and DOI Fish and Wildlife Service.	Approved.
Space Agreement (04.03) Planetary Working Group: (A) Proposed travel to the Soviet Union by one planetary scientist invited by Soviet Academy of Sciences, March 5–13. Scientist will deliver a lecture at the Vernadsky Institute of Geochemistry and Analytical Chemistry in Moscow. He will meet with Soviet planetary scientists at the Institute of Applied Mathematics and Space Research Institute. Visit scheduled to take place during landing of Soviet Venera 13 and 14 spacecraft on Venus and present rare opportunity for a US scientist to be present during real-time data transmission from a Soviet planetary mission. (B) Proposed travel to the Soviet Union by one planetary scientist in late April for ten days, invited by Soviet Academy of Sciences. He is scheduled to meet with Soviet counterparts in his capacity as US Project Leader for joint US–USSR studies of Venus electrical discharges, in order to discuss status of project and to exchange information. He would also have an opportunity to receive additional information and data from the Soviet Venera 13 and 14 missions. State believes it is in US interests to approve these trips, despite the US intention not to renew the Space Agreement. These visits are to the Soviet Union, will be low profile, and in one instance, offers an opportunity to be on hand as a Soviet planetary mission lands on Venus.	Approved.
Atomic Energy Agreement (07.01) Fundamental Properties of Matter: Three Soviets to Fermilab, Batavia, IL, in March (one for six months, two for two weeks) to work on experiment E516 (analysis of photo production data). Part of ongoing FPM program, routine basic research. (Moscow 1954).	Approved.
Science and Technology Agreement (01.0308): Four Americans to Kharkov and Kiev for seven days in May under Cryogenic Materials and Welds. This trip will allow for a wrap up of the five year program which is nearing completion. The USSR is progressing rapidly in the field of low-temperature mechanical properties and welding and these discussions will increase US knowledge of research in this area. This trip will include site visits to the Physico Technical Institute of Low Temperature, Paton Institute and Institute of Metal Physics. This area is important in the development of large-scale superconducting magnet structures and other low-temperature structures, such as storage of liquid fuel and for space applications.	Approved.
Science and Technology Agreement (01.0402): Two Soviets to Northeastern United States for ten days in Apirl/May under Forestry. The Soviets have shown promising potential in the use of chemical and biological control methods of hardwood pests and the gypsy moth, a native insect to the USSR, is not nearly as severe a problem there as it is in the US. This visit is a follow up to the visit to the USSR last spring by American scientists, during which the USSR gave the US 22,000 gypsy moth predators. The Soviet will visit the laboratories where these parasites are being reared and evaluated. There will be discussions on rearing methods as well as the use of small mammals and birds as predators. Site visits have been planned to compare techniques using chemical and microbial control methods on these hardwood defoliating pests.	Approved.

2. LIST OF OFFICIAL AMERICAN-SOVIET SCIENCE AND TECHNOLOGY EXCHANGES DURING 1982—Continued

Activity	Action
Science and Technology Agreement (01.15): Six Soviets to Chicago for seven days in May under Heat Transfer to attend Joint Workshop on Heat Transfer and Fluid Mechanics in Rheological Fluids (RF). RF are substances that do not obey usual laws of fluid mechanics. They are difficult to model or correlate and their understanding leads to better processing procedures and chemicals. Applications in the RF field include but are not limited to pharmaceuticals, mayonnaise and peanut butter. The Soviets are doing much more in this field than the US, they have better support and more people working in this area. The US stands to gain a great deal from participation in this workshop and especially in the obtaining latest Soviet data and analysis.	Approved.
MARCH 2, 1982	
Environment Agreement (02.05–1102): *Cranes and other Rare Birds:* Two Soviet specialists to visit the International Crane Foundation (Baraboo, Wisconsin) and Patuxent Wildlife Research Center (Laurel, Maryland) for two weeks in June 4, 1982, to conduct research on reproductive behavior and artificial breeding and insemination techniques.	Approved.
Environment Agreement (02.05–2101): *Taiga* and *Tundra Ecosystems:* Three American specialists to eastern Siberia for 6–8 weeks during July–August 1982. Two of them will study the biology of larch *(Larix dahurica)* in the Kolyma highlands, while the third will collect material for the study of taxonomic relationships of *Acanthis* in the far north. In return, two Soviet specialists would visit the United States for six weeks to study relict steppes in central Alaska.	Approved.
Environment Agreement (02.05–2102): *Permafrost-related Environmental Problems posed by Large-scale Construction Projects:* In 1981 the U.S. and Soviet sides agreed to present a joint paper on protection of permafrost terrain from environmental damage during large-scale pipeline construction projects at the August 1983 International Oil Congress in London. In order to complete the paper for submission to the Congress organizing committee, the U.S. side would like to invite 2–3 Soviet specialists to visit the United States for one week during June 1982.	Approved.
Science and Technology Agreement (01.0303): 4 Soviets to San Diego and Los Angeles for 10 days in April under Electron Beam Evaporation to attend an International Conference on Metallurgical Coatings. Jointly authored American and Soviet papers on microlaminates of TIC–NI and TIC–A203, work done at UCLA and the Paton Institute in Kiev under S&T agreement auspices, will be presented.	Approved.[1]
Science and Technology Agreement (01.0303): 3 Americans to Kiev, Tbilisi and Moscow for 14 days in May–June under Electron Beam Evaporation. This visit will be a wrap up to the Soviet attendance at the International Conference in April and will enable the Americans to visit institutes working in areas dealing with coated cutting tools, Electron Beam evaporation and superhard materials.	Approved.[2]
Science and Technology Agreement (01.0703): 8 Soviets to Cambridge for 7 days in April under Genetics of Microorganisms to attend to joint conference on "Genetic Control of the Synthesis of Secondary Metabolites of Actinomycetes". Soviet delegates have special expertise in streptomyces, which is in the same taxonomical family as actinomycetes, and the genus of streptomyces is of particular importance as a potential source of antibiotics. Conference will be oriented toward basic research with its practical implications for developing new methods of producing potential substances with significant medicinal use.	Approved.

See footnotes at end of table on p. 57.

2. LIST OF OFFICIAL AMERICAN-SOVIET SCIENCE AND TECHNOLOGY EXCHANGES DURING 1982—Continued

Activity	Action
Atomic Energy Agreement (07.03): 2 Soviets to Washington and Princeton for six weeks in the area of Controlled Thermonuclear Reactions to participate in experiments on RF plasma heating and current drive in the PLT Tokomak.	Approved.
Atomic Energy Agreement (07.03): 4 or 5 Americans to the USSR for 10 days in the area of Controlled Thermonuclear Reactions to visit the physics and engineering research institutions dealing with high field tokomaks and the T–15 Tokomak.	Approved.
MARCH 8, 1982	
Environment Agreement (02.05–1102): *Cranes and Other Rare Birds:* The Soviet side has invited three American bird specialists to attend the August 16–25, 1982, XVIII International Ornithological Congress in Moscow at the expense of the USSR (see Moscow 1434).	Approved.
Environment Agreement (02.05–1105): *Cooperation among Zoos in Captive Breeding of Rare and Endangered Animals:* Two-three Soviet specialists to attend the June 23–25, 1982, Third International Snow Leopard Symposium in Seattle. During their ten-day stay the Soviets would visit one or two zoos in New York, Omaha, Minneapolis, or San Diego.	Approved.
Environment Agreement (02.05–61): *Marine Mammals:* Two American biologists to the USSR for 3–4 weeks in June–July 1982, to take part in a Soviet Black Sea expedition which will census several species of dolphins and evaluate their population distribution and status.	Approved.
Environment Agreement (02.08–11): *Effects of Changes in the Heat Balance of the Atmosphere on Climate:* One Soviet to Environmental Data and Information Service (NOAA), the National Climatic Center in Ashville, NC, Geophysical Fluid Dynamics Laboratory, Princeton, NJ, and National Center for Atmospheric Research, Boulder, CO, for one month in June 1982. Visit is under item 4 of the protocol of the Seventh Joint Meeting of Working Group VII.	Approved.
MARCH 15, 1982	
Environment Agreement (02.08.13): The Influence of Changes in Solar Activity on Climate: One American to Leningrad for a collaborative study of variations in the solar constant and their effect on global climate for the past 100 years. (Item 3 of the protocol of the seventh joint meeting of working group VII).	Approved.
Environment Agreement (02.08.11): Effects of Changes in the Heat Balance of the Atmosphere on Climate. One Soviet to the US (Lawrence Livermore National Laboratory, DOE) for four weeks in May. Visit will involve discussion of research on the "General Circulation" model. Access to Lawrence Livermore will be limited on an escorted basis by DOE (Gerald L. Potter).	Approved.
MARCH 22, 1982	
Health Agreement (03.30): Individual Health Exchange: Two Soviets to Boston, Chicago, Salt Lake City, Cleveland, Hershey, PA, and New York in the Area of "shunting types of auxiliary blood circulation with the help of a roller pump in treatment of acute cardiac insufficiency. Stay of 55 days. Will also attend annual meeting of the American Society of Artificial Organs in Chicago, April 14–16.	Approved.
Artificial Heart Agreement (03.02): One Soviet to New York, Houston, Chicago, San Francisco, and Washington for 18 days in April 1982. He will also attend the annual meeting of the American Society of Artificial Organs in Chicago, April 14–16.	Approved.

2. LIST OF OFFICIAL AMERICAN-SOVIET SCIENCE AND TECHNOLOGY EXCHANGES DURING 1982—Continued

Activity	Action
Environment Agreement (02.05–7101): Threatened and Endangered Plants: One American to the Soviet Union, in April/May 1982, to carry out scientific research at several Soviet botanical gardens and arboreta in Moscow, Leningrad and Yalta, and to continue work on a joint paper.	Approved.
Health Agreement (03.0105): Sudden Death: Eight Americans to the Soviet Union in June/July 1982, to participate in the Third Joint US–USSR Symposium on Sudden Death in Kaunas, Lithuania. Also to visit Moscow and Leningrad.	Approved.
MARCH 29, 1982	
Health Agreement (03.0101): Pathogenesis of Arteriosclerosis. Two Soviets to Lawrence Berkeley, San Francisco (Cancer Research Institute) and Houston (Baylor University Department of Medicine) to conduct joint studies on the Pathogenesis of Arteriosclerosis.	Approved.
Health Agreement (03.0101): Pathogenesis of Arteriosclerosis. Two Americans to Moscow in June to attend the IX World Congress of Cardiology and to discuss status of joint studies in Area One.	Approved.
Agriculture Agreement: Activities proposed by USDA would be:	
A. *Crop Observation:*	
1. Spring Wheat Production: Three US specialists to visit representative spring wheat production areas for three weeks in July in the USSR during critical growth stages to study growing conditions, evaluate the effects of weather, cultural methods, other factors on projected production of spring wheat.	Approved.
2. Winter Wheat Production: Three-week visit by three US specialists to the USSR in June to study winter wheat production with objectives similar to spring wheat team.	Approved.
B. *Forage Grass Germ Plasm Exploration:* A US team of two scientists for 45 days to collect germ plasm of wild grass and legume forage species native to areas of the Soviet Union in order to expand US collections. Soviet varieties have contributed much to the development of improved plant varieties in the US. Likewise, US germ plasm can expand Soviet collections and resource base for study. In the past this has been to USDA one of the highest priority scientific projects under the Agricultural Agreement.	Approved.
C. *Veterinary Science:* Two US experts to visit the Soviet Union for 30 days to study reproductive diseases and other diseases foreign to the United States. Information on the continuing Soviet experience in immunizing and controlling outbreaks of diseases such as foot-and-mouth in livestock will be extremely valuable to US scientists in improving methods to insulate the US livestock industry against the disease or eradicate it immediately if outbreaks occur: livestock losses would exceed $10 billion if foot-and-mouth disease became widespread in the United States, with a corresponding 25 percent loss in meat and milk production. The importance of cooperation with the USSR which has considerable experiences with such diseases is obvious.	Approved.
APRIL 12, 1982	
Environment Agreement (02.05–61), Marine Mammals: Six–eight American scientists to participate in a six-week Bowhead whale and walrus survey expedition in the Bering and Chukchi Seas from July 15–September 1, 1982, aboard a Soviet research vessel. This cruise has been conducted annually by the two countries since 1979.	Approved.

2. LIST OF OFFICIAL AMERICAN-SOVIET SCIENCE AND TECHNOLOGY EXCHANGES DURING 1982—Continued

Activity	Action
Environment Agreement (02.05–7101), Threatened and Endangered Species: Two Soviet botanists to conduct research for 2–3 weeks in the laboratory of the New York Botanical Garden and to continue work on a joint taxonomic manual of the trees of the USSR. The work will also consist in part of cross-cataloging some 6,000 North American and European plant specimens collected during botanical expeditions conducted during the summer of 1981.	Approved.
Environment Agreement (02–05–61), Marine Mammals: One US biologist to Simferopol State University in August/September 1982, to conduct research on marine mammal parasitic fauna.	Approved.
Environment Agreement (02–05–11), Integrated Pest Management: Three Soviets to New York, Wooster, Mass., Stoneville, Miss., College Station, Texas, and Beltsville, Md. in May 1982, for three weeks for projected discussions at USDA labs and workshop at Beltsville Agricultural Research Center on application of pest control agents with minimal involuntary exposure.	Approved.
Environment Agreement (02.03–21), Interaction Between Forest Ecosystems and Pollutants: One Soviet to University of Illinois for one month in July 1982 to collaborate on electron microscopy of sulfur dioxide-affected poplar plants, primarily examining meristematic tissues.	Approved.
Health Agreement (03.30), Individual Health Exchange: Six US neurosurgeons to the USSR for two weeks in the spring of 1982 in the area of "New Stereotactic Methods for Treating CNS Lesions.	Approved.
Health Agreement (03.04), Environmental Health: A Soviet delegation (6–8) to the US in the area of "Nervous System Effects of Electromagnetic Waves (03–300 GH7)," in May 1982. The workshop will consist of formal presentations and discussions of topics of the participants' choosing. Also to be discussed will be development of joint research projects for review by US and Soviet coordinators.	Approved.
Health Agreement (03.0107), Hypertension: One American scientist to the Soviet Union in July 1982, for one month to pursue joint studies on psychological interventions and the sympathetic nervous system in primary hypertension. Further joint studies will be discussed in the area of nonpharmacologic interventions to reduce blood pressure in patients with primary hypertension.	Approved.
Health Agreement (03.0105), Sudden Death: Two Soviets to the US in the area of Sudden Death.	Approved.
Health Agreement (03.07), Vision Research: Four US scientists to the USSR for two weeks to follow up on earlier collaboration in joint animal studies and to become familiar with the Helmholtz procedures used to diagnose, treat, and evaluate patients with Retinitis Pigmentosa.	Approved.
Health Agreement (03.01), Cardiovascular Studies: One US scientist (Assistant Director of NIH National Heart, Lung and Blood Institute) to the USSR for three weeks to conduct joint discussions and to visit laboratories and clinics in Moscow and to attend the IX International Congress of Cardiology in Moscow.	Approved.
APRIL 19, 1982	
Oceans Agreement (06.00), Two US officials (NOAA) to Moscow (US Execsec and assistant) in June 1982 for three days to meet new Soviet Execsec and to discuss status of cooperation and continuation of existing cooperative activities.	Approved.
Health Agreement (03.0301): Cancer Research. One US scientist to the Soviet Union in May/June 1982, to participate in the symposium on "Bioorganic Chemistry and Drug Design" in Riga and to visit the All-Union Oncologic Scientific Center, the Shemyakin Institute and others in Moscow.	Approved.

2. LIST OF OFFICIAL AMERICAN-SOVIET SCIENCE AND TECHNOLOGY EXCHANGES DURING 1982—Continued

Activity	Action
Environment Agreement (02.01-24): Ferrous Metallurgy. Four US specialists to the USSR in June 1982, for two weeks to discuss environmental control problems in the iron and steel industry at appropriate research institute in Kharkov and Donetsk and to visit installations on advanced wastewater treatment and advanced air pollution control for rolling mills, blast furnaces, basic oxygen furnaces, and coke ovens.	Approved.
APRIL 23, 1982	
Environmental Agreement W.G. VIII (02.08-11), July 20-August 7, 1982. Visit of 8 U.S. scientists to participate in Symposium on Paleoclimatology during the INQUA Congress in Moscow.	Approved.
Environment Agreement (02.06-21), Effect of Pollutants on Marine Organisms: One Soviet specialist to the US for 3-6 months to work on a project on benthic bioassay. Possible additional work in Newport, Oregon within six month period.	Approved.
Environment Agreement (02.09-10), Earthquake Prediction: One US specialist to the USSR for two weeks in May and subsequent long-term research (6 months) in Soviet archives in Moscow and Leningrad on pre-1870 earthquakes in (then Russia) Alaskan.	Approved.
MAY 3, 1982	
World Oceans Agreement (06.0303): International Southern Ocean Studies (ISOS). Nine Soviets to Lamont-Doherty Geological Observatory, Palisades, NY, in September 1982, for four days for a post-Weddell Sea polynya expedition meeting.	Approved.
Environmental Agreement (02.02-12): Laboratory and Theoretical Investigations of the Physics of the Earthquake Source. One Soviet to the US for 2-3 months for an investigation of electrical phenomena, testing the case effect and for carrying out experiments using a big sample.	Approved.
Atomic Energy Agreement (07.03), Fusion: Three US scientists to Moscow, Kharkov and Leningrad in May/June 1982, as part of the US-USSR Fusion Personnel Exchange (topic: Stellerators).	Approved.
Environmental Agreement (02.08-13), Climate: Two Soviet scientists to National Center for Atmospheric Research Boulder, CO, for 10 days in August 1982, to analyze data obtained during Solar Eclipse Expedition in USSR.	Approved.
Environmental Agreement (02.05-1103), Study and Conservation of Rare and Endangered Animals: Four Soviet specialists to the US in October, 1982 to view furbearer propagation facilities in Maryland, North Carolina, and Michigan.	Approved.
Environmental Agreement (02.02-21), Prevention of Water Pollution from Municipal and Industrial Sources: One US specialist to the USSR for 5 days in June/July 1982, for technical discussions with Ministry of Timber, Pulp and Paper, and Wood Processing Industry, and affiliated research institutes on recent advances in water pollution control and aspects of information exchange related thereto.	Approved.
Environmental Agreement (02.06-11), Prevention and Cleanup of Pollution of the Marine Environment from Shipping: Invitation to one Soviet to submit paper to attend the VIII Conference on the Prevention, Behavior, Control and Cleanup of Oil Spills to be held February 28-March 3, 1983, in San Antonio, TX.	Approved.
Health Agreement (03.0303), Cancer Virology: One US specialist to the USSR for two months beginning June 1982, to perform joint experiments in "Herpes Virus Papio: Modulation of virus Expression in Baboon Lymphoma".	Approved.
Health Agreement (03.0106), Blood Transfusion: One US specialist to the USSR for 17 days in September/ October 1982, to continue joint studies with Soviet counterparts in the area of blood gravitation surgery (hematopheresis).	Approved.

2. LIST OF OFFICIAL AMERICAN-SOVIET SCIENCE AND TECHNOLOGY EXCHANGES DURING 1982—Continued

Activity	Action
MAY 17, 1982	
Atomic Energy Agreement (07.03), Fusion: Five US scientists to the Soviet Union in May/June 1982, as part of the US/USSR Fusion Personnel Exchange II–6, "Physics and Engineering of High Field Tokamaks and T–15".	Approved.
Atomic Energy Agreement (07.03), Fusion: One US scientist to the Soviet Union in June/July 1982, as part of the US/USSR Fusion Personnel Exchange II–4, to participate in experiments on ECR heating on T–10.	Approved.
Atomic Energy Agreement (07.03), Fusion: Five US scientists to the Soviet Union in June 1982, as part of the US/USSR FUSION Personnel Exchange II–5, "Theory of Alpha Particle and Energetic Ion Behavior".	Approved.
Atomic Energy Agreement (07.01), Fundamental Properties of Matter: Four Soviets to Fermi Lab, Batavia, Illinois in May for three months, to participate in experiments on the polarized beam facility at Fermi lab (Proposal E–704).	Approved.
Environmental Agreement (02.05–61), Marine Mammals: Two specialists to the USSR (Magadan) in October, 1982 to work with the osteological collections of ice seals, walrus and other pinnipeds at the TINRO laboratory. This visit would represent a major breakthrough in geographical access for the U.S. side, which has tried repeatedly since the inception of this Project to secure a Soviet invitation to work at this marine mammal laboratory in Magadan.	Approved.
Environmental Agreement (02.09.11), Field Investigation of Earthquake Prediction: Three US specialists to the USSR in June/July 1982, for joint work in field research on earthquake prediction.	Approved.
Environmental Agreement (02.09.13), Mathematical and Computational Prediction of Places Where Large Earthquakes Occur: One US specialist to the USSR in June/July 1982, for joint work on pattern recognition techniques as applied to earthquake occurrence.	Approved.
MAY 24, 1982	
Health Agreement (03.0103): Two US specialists to the USSR in September 1982, for two weeks to present lectures at scientific research institutes in Moscow and Leningrad and one other center with a strong research program in cell biology.	Approved.
JUNE 7, 1982	
Environment Agreement (02.05–1102), Rare and Endangered Birds: Two Soviet ornithologist to visit the United States for two weeks in November 1982, in order to attend the Annual Meeting of the Raptor Research Foundation (to be held in Salt Lake City) and to conduct field studies on rare species of falcons.	Approved.
Environment Agreement (02.05–41), Biosphere Reserves: Six American scientists to the USSR for two weeks in September/October 1982, to conduct pollution monitoring studies on various Soviet biosphere reserves.	Approved.
JUNE 14, 1982	
Atomic Energy Agreement (07.01), Fundamental Properties of Matter: One US specialist to the Soviet Union in July for two weeks to the Institute of High Energy Physics to work on the physics of constituent models of quarks and leptons, grand unified theories, supersymmetry, and cosmology.	Approved.

2. LIST OF OFFICIAL AMERICAN-SOVIET SCIENCE AND TECHNOLOGY EXCHANGES DURING 1982—Continued

Activity	Action
JUNE 24, 1982	
Environment Agreement (02.02–21): Prevention of Water Pollution from Industrial and Municipal Sources. Four Soviet specialists to the US (Washington, Cincinnati, and Oak Ridge, TN) in October 1982, for a joint workshop/discussions on water pollution control from industrial and municipal sources.	Approved.
Environment Agreement (02.08–12), Effects of Pollution of the Atmosphere on Climate: Two Soviet specialists to the US for one month, September/October 1982, to continue joint research on the radiation budget in the tropics.	Approved.
JULY 2, 1982	
Environment Agreement (02.11–11), Administrative/Legal Measures: Five–six US environmental attorneys to the USSR for two weeks in September 1982, for a biennial project meeting.	Approved.
Environment Agreement (02.11–11), Administrative/Legal Measures: Five-six representatives of All-Russian Nature Conservation Society to the US in December, 1982 for two weeks (under Sierra Club sponsorship), for discussions on role and management of public environmental organizations.	Approved.
Environment Agreement (02.08–10), Pollution and its Effects on Climate: Nine Soviets to the US (Boulder, Colorado, LaJolla, California, and Washington) for two weeks in October 1982, for the Eighth Joint Meeting of Working Group VIII, on the influence on Climate of changes in the heat balance of the atmosphere and the effects of pollution and solar activity.	Approved.
JULY 12, 1982	
Environment Agreement (02.09–12), Earthquake Prediction: Laboratory/Theoretical Research. One US specialist to the USSR for two months in September 1982, to continue theoretical work on earthquake source mechanisms.	Approved.
JULY 19, 1982	
Health Agreement (03.06), Influenza—Infectious Diseases: One Soviet Specialist to the US (Phoenix, Arizona) for six weeks in September 1982, to study the effects of new non-A/non-B hepatitis viruses on non-human primates and to develop methods of virus purification.	Approved.
Atomic Energy Agreement (07.03), CTR: An unspecified number of Soviet specialists to Baltimore in September 1982, for the US–USSR Joint Fusion Power Coordinating Committee (Soviets will be in the US at that time for the IAEA meeting).	Approved.
JULY 26, 1982	
Environment Agreement (02.00): Executive Secretary to Moscow October 11–14, for discussions with Soviet Execsec and project participants as well as consultations with Embassy personnel regarding level and nature of Embassy support for agreement activities. (Soviet Execsec was in the US for similar purposes in connection with a project meeting in March 1982.) US Execsec will be in Yugoslavia earlier in October and continuing to Moscow will be cost-effective. Execsec wants to discuss with Soviets problems in area 02.03–11 (Integrated Pest Management) as well as recent exit problems at Moscow's airport, admin/logistical matters, and specific projects where the Soviets have not performed adequately. Execsec wishes to redirect the focus in this regard into areas of greater US benefit.	Approved.

2. LIST OF OFFICIAL AMERICAN-SOVIET SCIENCE AND TECHNOLOGY EXCHANGES DURING 1982—Continued

Activity	Action
Environment Agreement (02-09.13), Mathematical and Computational Prediction of Places where large Earthquakes Occur and Evaluation of Seismic Risk: One US specialist to the USSR in September for one month (Moscow) to continue ongoing work involving the study of the correlation of long-period seismic noise and atmospheric pressure and research on the suppression of baro-seismic noise.	Approved.
Environment Agreement (02.09–12): Laboratory and Theoretical Investigations of the Physics of the Earthquake Source. One US specialist to the USSR for 2–3 months beginning September 1, to continue theoretical work on earthquake source mechanisms.	
Atomic Energy Agreement (07.03), Topical Tour: Material for Controlled Fusion. Four Soviets to the US 8/17–27 to discuss basic research done in US and USSR on withstanding a fusion environment. Visiting Brookhaven National Lab, Oak Ridge National Lab, Argonne National Lab, and University of Wisconsin.	Approved.
Atomic Energy Agreement (07.03), Topical Tour: Edge Plasma Physics. Three Soviets to the US 8/14–26 to discuss maintaining plasma purity in a fusion device. Visiting General Atomic Company, Oak Ridge National Lab and Princeton Plasma Physics Lab.	Approved.
AUGUST 3, 1982	
Health Agreement (03.06), Influenza: Two Soviets to the US for three months commencing October 1982, to work on influenza recombinant DNA and hybridization projects at CDC, Atlanta, and St. Jude Hospital, Memphis.	Approved.
Atomic Energy Agreement (07.03), CTR: Two Soviets to Princeton in September for work in RF heating and current crive experiments.	Approved.
Atomic Energy Agreement (07.03), CTR: Project I-5. Four Soviets to Los Alamos, Oak Ridge, and Princeton in September for two weeks for a workshop on engineering problems.	Approved.
AUGUST 9, 1982	
Health Agreement (03.03): Two Soviets to the US in the area of cancer treatment and epidemiology for two months beginning in October.	Approved.
Health Agreement (03.04): Two US scientists to the USSR in September for 10 days in the area of environmental health to discuss details and to receive a demonstration of all procedures to be used in the duplicate project of test methodologies for determination of EM field effects on the CNS.	Approved.
AUGUST 16, 1982	
Environment Agreement (02.09–13), Mathematical and Computational Prediction of Places Where Large Earthquakes Occur and Evaluation of Seismic Risk: One US specialist to the USSR for two weeks in September to work at the Institute of Earth Physics, Moscow, on noise reduction in Sprengnether seismometers, including instruments, networks, and data processing.	Approved.
AUGUST 30, 1982	
Atomic Energy Agreement (07.01), Fundamental Properties of Matter: Two Soviets to Stanford Linear Accelerator Center (SLAC), one for three months and one for six months, to work on storage ring detectors and experiments on electron positron colliding beams.	Approved.
Atomic Energy Agreement (07.01), Fundamental Properties of Matter: Three Soviets to Fermi Lab for one month in early September to work on experimental problems developing proton/anti-proton colliding beam facilities and carrying out experiments on them.	Approved.
Health Agreement (03.0503), Surgical Treatment: Two Soviets to the US in March 1983, to attend Hip Society, research Society, and American Academy of Orthopaedic Surgeons meetings.	Approved.

2. LIST OF OFFICIAL AMERICAN-SOVIET SCIENCE AND TECHNOLOGY EXCHANGES DURING 1982—Continued

Activity	Action
Health Agreement (03.0102): Five US specialists to the USSR in October 1982, for discussions on isohemic heart disease.	Approved.
Health Agreement (03.03), Malignant Neoplasia: Two Soviets to the US (Seattle, WA, Ann Arbor, MI, and Bethesda) for three weeks beginning September 6, in the area of cancer treatment, anti-cancer drug development and biochemical pharmacology. Also to attend XIII International Cancer Congress in Seattle, WA, September 8–15.	Approved.
Environment Agreement (02.03–21), Interaction Between Forest Ecosystems and Pollutants: Two Soviets for three weeks (or one for 6 weeks) in May-June 1983 for electron microscopy studies of S02 effects on forest plants. Work to be carried out at University of Illinois, Champaign, IL.	Approved.
SEPTEMBER 13, 1982	
Atomic Energy Agreement (07.03), Fusion Program: Four Soviets to the US for two weeks beginning o/a September 21, visiting Princeton, Oakridge, and Los Alamos, for exchange item 1.5, Workshop on Engineering Problems in Experimental Fusion Facilities.	Approved.
Housing Agreement (10.03), Project 1.7, Wood Building Products and Components: An unspecified number of Soviets to the US (Madison, Wisconsin and Washington, D.C.) sometime between March and July of 1983 for technical sessions and visits to industrial sites.	Approved.
Environment Agreement (02.05–2101), Taiga and Tundra Ecosystems: Small US group to the Soviet Union (either Moscow or Magadan for 7–10 days in either November 1982 or January 1983, to discuss future research to be carried out and the status of pending exchanges in early 1983.	Approved.
SEPTEMBER 20, 1982	
Environment Agreement (02.07–11), Biological and Genetic Effects of Pollutants: Two US specialists for an undetermined period in FY 83 to Moscow, Institute of General Genetics, for collaborative genetic toxicology studies of environmental mutagenic and carcinogenic compounds (e.g. pesticide components).	Approved.
Environment Agreement (02.03–31), Forms and Mechanisms by which Pesticides and Chemicals are Transported: Two Soviet scientists to EPA's Athens, GA, laboratory for 45 days in the spring of 1983 to continue joint research on pollutant transformation kinetics in sediment water systems.	Approved.
Transportation Agreement (05.0402), Civil Aviation Air Traffic Control, Omega Program: An undetermined number of Soviets to the International Omega Association Seventh Annual Meeting October 12–14, 1982, in Arlington, VA. Soviets would be asked to present a paper on Soviet work in the Omega navigation field.	Approved.
SEPTEMBER 27, 1982	
Environment Agreement (02.05–1105), Cooperation Among Zoos in the Conservation of Threatened and Endangered Species: Transfer of two Siberian tiger cubs from the Moscow Zoo as part of continuing exchange of endangered species for captive breeding. The transfer would take place in early 1983 and the cubs would go to the Omaha Zoo.	Approved.
Environment Agreement (02.09–11), Field Investigations of Earthquake Prediction: One Soviet to the US (MIT) for one month in November 1982, to discuss problems related to vertical seismic profiling to earthquake prediction.	Approved.
Environment Agreement (02.09–11), Field Investigations of Earthquake Prediction: One Soviet to the US (Menlo Park, CA) for two months commencing March 1983, to work on deep seismic sounding of the earth's crust.	Approved.

2. LIST OF OFFICIAL AMERICAN-SOVIET SCIENCE AND TECHNOLOGY EXCHANGES DURING 1982—Continued

Activity	Action
Environment Agreement (02.09–13), Mathematical and Computational Prediction of Places Where Large Eathquakes Occur and Evaluation of Seismic Risk: One Soviet to the US (MIT) for four months commencing November 1982, to continue ongoing project work relative to long-period seismometer noise reduction.	Approved.
OCTOBER 4, 1982	
Environment Agreement (02.05–1103), Rare and Endangered Animals: Three or four Soviet specialists on furbearing animals to visit the U.S. (Maine, Maryland, North Carolina) for 2 weeks in late March-early April 1983. The delegation will work with American colleagues on habitat quality evaluation, home range analysis, radiotelemetry techniques, censusing and impact of introduced mammals.	Approved.
Environment Agreement (02.05–61), Marine Mammals and (02.05–81), Ichthyology and Aquaculture: Working group meeting in late January to be attended by 6–8 Soviet specialists from MINFISH and the Academy of Sciences for a period of 7–10 days (probably in Seattle).	Approved.
Environment Agreement (02.05–61), Marine Mammals: Two Soviets to visit Hubbs Sea World (San Diego) for one month in January-February, 1983 to continue research with American colleagues on killer whale color patterns.	Approved.
Health Agreement (03.0104), Congenital Heart Disease: One Soviet to Bethesda, University of Pennsylvania, and Duke University for continuing work on joint studies for one month, January/February 1983.	Approved.
OCTOBER 12, 1982	
Environment Agreement (02.05–1105), Cooperation Between U.S. and Soviet Zoos: Three U.S. snow leopard specialists to the USSR for 2 weeks in March–April 1983 to visit snow leopard collections in several Soviet zoos and devise with Soviet colleagues a captive breeding strategy to prevent extinction of this endangered and declining species.	
Environment Agreement (02.05–2101), Taiga and Tundra Ecosystems: Three Soviet specialists to attend and present papers at the First International Muskox Symposium, to be held in Fairbanks May 25–27, 1983. The delegation would spend a total of 10–12 days in Alaska, and the trip would be preparatory to a later return visit by American scientists to USSR muskox transplant release sites on the Taimyr Peninsula and Wrangel Island.	
Environment Agreement (02.05–41), Bering Sea Studies: Soviet and U.S. marine scientists for a follow-up research expedition to the Bering Sea in the summer of 1983. Four to six American specialists to visit Moscow for 7–10 days in the first quarter of 1983 to plan the work to be accomplished during this cruise.	Approved.
Health Agreement (03.07), Eye Disease: One Soviet to Bethesda in November for 5–6 days after attendance at an international congress on ophthamology.	Approved.
Health Agreement (03.03), Malignant Neoplasa: Carcinogenesis workshop in Moscow in December. An as-yet undetermined number of American specialists to discuss progress of monograph.	Approved.
OCTOBER 15, 1982	
Atomic Energy Agreement (07.01): Fundamental Properties of Matter. Exchange Item 13: Research on solar neutrino problems. One US specialists to the USSR (Moscow and Yerevan) for one month in November 1982.	Approved.
Atomic Energy Agreement (07.01), Fundamental Properties of Matter. Exchange Item 6: Guage Theory Workshop. Up to six US specialists to the USSR (Yerevan) for two weeks in the spring of 1983.	Approved.

2. LIST OF OFFICIAL AMERICAN-SOVIET SCIENCE AND TECHNOLOGY EXCHANGES DURING 1982—Continued

Activity	Action
Atomic Energy Agreement (07.03), Controlled Thermonuclear Reaction. Exchange Item 1.2, Mirror Exchange: Six Soviets to the US (New Orleans for the American Physical Society Meeting, Livermore Labs, San Francisco, CA, and Science Applications, Inc. in Boulder, Colorado) for two weeks in November 1982.	Approved.
Environment Agreement (02.05–41), Biosphere Reserves: Six Soviet monitoring specialists to visit biosphere reserves in Michigan and Oregon during the 2d quarter of 1983 to conduct air, water and soil field experiments as part of the continuing work under the bilateral program of paired reserves.	Approved.
Environment Agreement (02.05–51), Arid Ecosystems: Four or five American desert specialists to visit the USSR (Central Asia) for 15 days in May 1983, for familiarizations with local fauna and flora, canals, irrigation systems and climate patterns.	Approved.
Environment Agreement (02.05–81), Ichthyology and Aquaculture: Up to eight U.S. biologists to take part in a joint symposium on fish diseases, virology, immunology and physiology to be held in the USSR in March-April 1983. (10 days).	Approved.
OCTOBER 22, 1982	
Housing Agreement (10.03), Building Materials and Components: An undetermined number of Soviet specialists to the US (New York, Washington, Vicksburg, Mississippi, Dallas, Texas, and San Francisco, April 7–18 on concrete projects.	Approved.
NOVEMBER 1, 1982	
Atomic Energy Agreements (07.03), CTR: Exchange Item 1.4, Analysis of Beta limitations in Tokomaks. Two Soviets to the US from November 22 to December 8. Also to cover Exchange Item 1.7, Transportation Models in Bampitori and Stellerators. To visit Princeton Plasma Lab and Oakridge National Lab.	Approved.
Health Agreement (03.06), Influenza and Hepatitis: Two Soviets to the US for four weeks in April 1983, to Phoenix, AZ, and Atlanta, GA for continuing research.	Approved.
Environmental Agreement (02.05–2101), Taiga and Tundra Ecosystem: One Soviet biologist for 10–14 days in February 1983, to attend a polar bear workship and organizational steering committee meeting in Arizona.	Approved.
Environment Agreement (02.05–2101), Taiga and Tundra Ecosystems: Up to six American muskox specialists to the Taimyr Peninsula and possibly Wrangel Island for 2–3 weeks during the summer of 1983 to survey the release sites for muskoxen transplanted from the U.S. to the USSR in 1975–1976.	Approved.
Environment Agreement (02.05), General: U.S. Area V Coordinator to Moscow during the week of December 13–17, 1982, for working level meetings with counterpart Soviet project leaders and coordinators.	Approved.
NOVEMBER 5, 1982	
Atomic Energy Agreement (07.01), Item 12: One US specialist currently working at CERN (Switzerland) to Novosibirsk for one week in November 1982, under the FPM continuing program of research.	Approved.
Atomic Energy Agreement (07.01), Item 8: Two US specialists to the USSR (Dubna and IHEP) for three weeks beginning November 21, 1982, under exchange item 8 of the JCC/FPM, study of high energy particle channeling in mono crystals. Also a vist to the Baksan cosmic ray detector in the Caucasus mountains is planned.	Approved.

2. LIST OF OFFICIAL AMERICAN-SOVIET SCIENCE AND TECHNOLOGY EXCHANGES DURING 1982—Continued

Activity	Action
Environment Agreement (02.05–61), Marine Mammals: One or two Soviet scientists to participate in a marine mammal research cruise abroad the USCG icebreaker "Westwind" from January 30–March 2, 1983, in the Navarin Basin. The objective of this expedition will be to describe the distribution, abundance and behavior of bowhead whales and other marine mammal species in their winter habitat.	Approved.
Environment Agreement (02.05–71), Animal and Plant Ecology: One Soviet specialist on cranes and aviculture, to a February 21–25, 1983, symposium in Los Angeles on captive breeding of birds, sponsored by the International Foundation for the Conservation of Birds. The organizers will pay all travel and lodging expenses.	Approved.
NOVEMBER 15, 1982	
Environment Agreement (02.09–12), Laboratory and Theoretical Investigations of the Physics of the Earthquake Source: Two Soviets January–March 1983, to Menlo Park, Los Angeles, CA, and Boulder, CO, to work on earthquake prone area prediction using mathematical and pattern recognition methods.	Approved.
Atomic Energy Agreement (07.03), CTR: Exchange Items 1.4 and 1.7. Analysis of Beta Limits in Tokamaks and Transport Models in Bumpy Tori and Stellrators. Two Soviets to the US in November 1982, for three weeks.	Approved.
NOVEMBER 23, 1982	
Environment Agreement (02.09–14), Engineering—Seismological Investigations: Four US specialists to the USSR in January/February 1983 for one week: Work on strong motion instrument arrays in the USSR; experimental verification of soil-structure interaction models; simulation of ground motions using explosives; and determination of scaling relationships for structures.	Approved.
Environment Agreement (02.05–210), Permafrost—Related Environmental Problems Posed by Large-Scale Construction Projects: Two Soviet specialists to the US in the first quarter of 1983 for 10 days to continue work on a joint paper (drawing from the experiences of each country) on protection of permafrost terrain from environmental damage during large-scale pipeline construction projects, to be presented at the August, 1983 International Oil Congress in London. Background: In 1981, the US and Soviet sides agreed on the desirability of presenting a joint paper on this subject. The focus of the paper is to be on environmental protection considerations of pipeline construction and engineering. This proposed visit would formally reschedule a visit which was postponed in October 1982.	Approved.
World Oceans Agreement (06.02), Polymode:	
(A) One Soviet specialist to Harvard University for one month commencing in January 1983, to continue joint work on numerical modelling of synoptic eddies.	Approved.
(B) Three Soviet specialists to Harvard University for one month commencing in February 1983, to continue joint work on numerical modelling of synoptic eddies.	Approved.
Agricultural Agreement (09.01), Research and Technology: Three Soviet specialists to the US in December 1982, for approximately 15 days to visit USDA research center in Beltsville, Maryland; Ohio University, and the University of Wisconsin, in the area of genetic engineering. This constitutes a return visit by a USDA team to the USSR in May 1978, in molecular genetics.	Approved.
NOVEMBER 29, 1982	
Health Agreement (03.04), Environmental Health: Two US specialists to Moscow, Lenigrad and Kiev January 14–30, 1983, in the area of biological effects of electromagnetic waves.	Approved.

2. LIST OF OFFICIAL AMERICAN-SOVIET SCIENCE AND TECHNOLOGY EXCHANGES DURING 1982—Continued

Activity	Action
Health Agreement (03.07), Eye Diseases: One Soviet to Bethesda for two weeks in December 1982, for continuing research.	Approved.
Health Agreement (03.07), Influenza: One Soviet to Bethesda for two weeks in December 1982, to discuss the 1983 program.	Approved.
Health Agreement (03.00) One Soviet to Bethesda for two weeks in December 1982, to discuss the 1983 program.	Approved.
Health Agreement (03.04), Environmental Health: One Soviet to Bethesda and North Carolina for two weeks in December 1982, to discuss the 1983 program.	Approved.
Health Agreement (03.03), Cancer: One Soviet to Bethesda in early 1983 to discuss ongoing program.	Approved.
DECEMBER 13, 1982	
Housing Agreement (10.02), Utility Systems: Project 1.2, External Utility Systems for Populated Areas. Seminar to be held in the U.S. in third quarter of 1983. Number of Soviet participants as yet undetermined.	Approved.
Housing Agreement (10.02), Utility Systems: Project 1.1, Internal Systems for Utilities and Energy Conservation in Residential, Public and Commercial Buildings. Seminar to be held in the USSR in the second quarter of 1983. Number of American participants as yet undetermined.	Approved.
Health Agreement (03.03), Cancer: One Soviet for one month to NIH and Harvard in Feb./Mar. 1983 for continuing research.	Approved.
DECEMBER 20, 1982	
Oceans Agreement (06.04), Polymode: Two U.S. specialists to Moscow for one week in January 1983, to complete Polymode data exchange.	Approved.
Atomic Energy Agreement (07.03), CTR. II-2: Topical Meeting on Compact Tori. Four U.S. specialists to Moscow January 6–26, 1983.	Approved.
Atomic Energy Agreement (07.01), FPM. Exchange Item 18: Preparation of Joint Experiments in Polarization Effects. Fermilab E-704. Two Soviets to Batavia, Illinois in January 1983, for two weeks.	Approved.
DECEMBER 27, 1982	
Atomic Energy Agreement (07.01), Fundamental Properties of Matter: Three Soviets to Fermilab in January 1983, for three months for a study of rare decays and properties of charged hyperons.	Approved.
Atomic Energy Agreement (07.01), Fundamental Properties of Matter: Two Soviets to Fermilab in January, 1983 (one Soviet for 2 weeks and the other for 1 month) for participation in preparation of joint experiments on Polarization Effects.	Approved.
Environmental Agreement (02.03–10), Influences of Environmental Changes on Climate: Three Soviets to the US (Washington, D.C., Boulder, Colorado, and Seattle, Washington) from January 20 to February 3, 1983, to participate in the Working Group VIII meeting and to discuss plans for a possible joint US-Soviet cruise at the end of 1983 to measure atmospheric trace gases.	Approved.

[1] This visit is related more to attendance at an international conference and less to S&T Agreement which will lapse in July 1982. Site visit in conjunction with conference were not approved.

[2] Despite non-renewal of S&T Agreement, this proposed visit gives U.S. scientists one more opportunity for a wrap-up visit to Soviet facilities.

3. LIST OF PROTOCOLS UNDER THE UNITED STATES-CHINA SCIENCE AND TECHNOLOGY AGREEMENT [1]

Student and Scholar Exchanges (agreed to October 1978), Committee on Scholarly Communication with the People's Republic of China.
Agricultural Exchanges (agreed to November 1978), Department of Agriculture.
Space Technology (agreed to November 1978), National Aeronautics and Space Administration.
High Energy Physics (signed January 31, 1979), Department of Energy.
Management of Science and Technology Information (signed May 8, 1979), Department of Commerce.
Metrology and Standards (signed May 8, 1979), Department of Commerce.
Atmospheric Science (signed May 8, 1979), National Oceanic and Atmospheric Administration.
Marine and Fishery Science (signed May 8, 1979), National Oceanic and Atmospheric Administration.
Medicine and Public Health (signed June 22, 1979), Department of Health and Human Services.
Hydroelectric Power and Related Water Services (signed August 28, 1979), Department of Energy.
Earthquake Studies (signed January 24, 1980), National Science Foundation and US Geological Survey.
Earth Sciences (signed January 24, 1980), US Geological Survey.
Environmental Protection (signed February 5, 1980), Environmental Protection Agency.
Basic Sciences (signed December 10, 1980), National Science Foundation.
Building Construction and Urban Planning Science and Technology (signed October 17, 1981), Department of Housing and Urban Development.
Nuclear Safety (signed October 17, 1981), Nuclear Regulatory Commission.
Surface Water Hydrology (signed October 17, 1981), US Geological Survey.

4. SCIENCE, TECHNOLOGY, AND AMERICAN DIPLOMACY, 1982: THIRD ANNUAL REPORT SUBMITTED TO THE CONGRESS BY THE PRESIDENT PURSUANT TO SECTION 503(b) OF TITLE V OF PUBLIC LAW 95-426 (EXCERPTS)

People's Republic of China

INTRODUCTION

The United States/People's Republic of China Agreement on Cooperation in Science and Technology was signed by President Carter and Vice Premier Deng Xiaoping in January 1979, soon after the announcement of normalization of relations between the two countries.

The executive body for the agreement is a Joint Commission co-chaired on the PRC side by Vice Premier Fang Yi and on the United States side by Dr. George A. Keyworth, the Science Advisor to the President and Director of the Office of Science and Technology Policy (OSTP). OSTP serves as the executive agent for the Agreement on the U.S. side. The State Department's Office of Cooperative Science and Technology Programs in the Bureau of Oceans and International Environment and Scientific Affairs (OES) provides the U.S. executive secretariat. The executive agent on the Chinese side is the State Scientific and Technological Commission (SSTC).

The exchanges with the PRC were highlighted in 1981 by Fang Yi's visit to Washington in October for the second meeting of the Joint Commission. In addition to his meetings with Dr. Keyworth, the Vice Premier also met with Secretary Haig and members of Congress, and toured scientific facilities on the West Coast including the Jet Propulsion lab, Lockheed, the Stanford Linear Acceleration, and the University of California at Berkely. The discussions during Fang Yi's visit tangibly demonstrated the importance both countries place on scientific and technical cooperation.

The third year of the Agreement on Science and Technology saw continued development of plans for cooperative activities under the 14 technical protocols signed in 1979 and 1980. This phase has now been completed or is nearing completion in most agreements, so cooperative activities can be expected to develop at a more rapid pace in the coming year.

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[1] Also noted are the U.S. Government agencies responsible for carrying out the cooperative exchanges.

Significant cooperative work is already underway in a number of areas. For example, the exchange of scholars and students, now in its third full year, continues to grow and prosper. The 1981–82 academic year finds over 50 Americans studying and doing research in China in the humanities, social sciences and natural sciences. Plans for the 1982–83 academic year call for grants for an equal number of American scholars and students to work in China. The American academic and research community highly values this program which provides Americans access to a broad range of study and research opportunities in China after a generation of severely restricted contacts. On the Chinese side, more than 5,000 Chinese scholars and students are currently in the U.S. under official and private auspices. The program on both sides is helping to educate a new generation of scholars and thereby build lasting ties between the scientific communities and the two countries.

The Protocol for Cooperation in Medicine and Public Health covers ten areas of cooperative scientific activity. Owing to its large and generally non-mobile population, China offers opportunities for studies in medical epidemiology which are not available in the US. Joint US–PRC efforts have included review of data in the areas of cancer and cardiovascular diseases in which diet, nutrition, health habits and environmental factors can be correlated with the incidence of certain diseases and conditions. In the area of health services research, a pilot project was undertaken in Shanghai Country in 1981 in which a descriptive analysis of the primary health care system was conducted by a joint US–Chinese team and reviewed in a workshop held in Shanghai in July. This project has been an important step toward understanding different approaches to primary health care and how strides can be made in a relatively short time to control infectious and parasitic diseases, drastically reduce infant morality rates, and conduct effective programs of planned motherhood. This information is of significant value both to US health programs and to developing countries.

In agriculture, the two sides have exchanged 47 teams in various fields including animal health, plant production and protection, forestry and soil conservation. The US side has been able to collect live specimens of natural enemies of crop pests which may be of benefit in controlling crop damage without the use of expensive insecticides. Four longer-term cooperative programs are now underway in improving fruit crop characteristics; sediment research; saline and alkaline soil study; and joint tree improvement.

Cooperation under the marine and fisheries science protocol was highlighted by the June 1980 visit to China of the US research ship *Oceanographer*, which joined three Chinese research vessels in a month-long study of sedimentation patterns in the Yangtze estuary. Scientists of both countries are continuing to work together to analyze samples and data obtained at that time. Phase Two of the three-year project continued in 1981 with three cruises involving US scientists and equipment on Chinese vessels. It will culminate in a joint international symposium early 1983.

The Earthquake Studies Protocol directly assists US scientists in work on earthquake prediction and earthquake hazards mitigation. China gives large-scale support for earthquake prediction and has a higher rate of seismicity for large earthquakes than the United States; American agencies thereby have access to data more rapidly than they would have through exclusively domestic programs. Projects were started during 1980 and 1981 to conduct or expand existing seismic observations in China, and to study and analyze earthquake phenomena in both countries for the purpose of earthquake prediction. Exchanges of seismic data and records has begun. Biltateral workshops were conducted in both countries in 1981 on hazards mitigation.

The US and the PRC have continued to explore new areas of cooperation. Negotiations were concluded in 1981 on new agreements for cooperation in the fields of building construction and urban planning, nuclear safety, and surface water hydrology. They were signed October 17, 1981, at the conclusion of the second meeting of the US–PRC Joint Commission on Scientific and Technological Cooperation, held in Washington. The agreements were:

Protocol Between the Department of Housing and Urban Development and the State Capital Construction Commission on Cooperation in the Field of Building Construction and Urban Planning Science and Technology;

Protocol Between the Nuclear Regulatory Commission and the State Scientific and Technological Commission on Cooperation in Nuclear Safety Matters; and

Protocol Between the Geological Survey of the Department of the Interior and the Bureau of Hydrology of the Ministry of Water Conservancy for Scientific and Technical Cooperation in the Study of Surface Water Hydrology.

The signing of these protocols brought to 17 the number of technical accords for implementing the 1979 Umbrella Agreement. Discussions and negotiations began or continued in 1981 to add still further areas to these already agreed upon. Agreements for cooperation in nuclear physics and magnetic fusion research, cartography, and transportation are being discussed.

The first three years of the Science and Technology Agreement have been marked by substantial achievements. A solid foundation has been laid both in formal agreement and shared working experience for further achievements. To be sure, the program of cooperation has not been without its problems. The Chinese have pressed for more rapid relaxation of US export controls, while the US has pressed for relaxation of limits on field research and library access in the PRC. Both parties have faced budget reductions that affect some of the programs of bilateral cooperation. But such problems are inevitable in an undertaking of the scope of the US–PRC science and technology exchanges, especialy considering the vast differences between the two societies and social systems and the fact that the relationship is still very new. Both sides share a commitment to the success of the relationship and agree that these problems will not be allowed to interfere in achieving shared objectives in broadening and deepening cooperation between the two nations' scientific communities.

The program of scientific and technological cooperation has helped provide the substance of a viable, long-term relationship between the US and the PRC. The progress in scientific relations, both on the formal and on the personal and institutional level, has reinforced progress in overall bilateral relations. The program promises to continue serving American interest by fostering and sustaining relations with China.

DEPARTMENT OF COMMERCE, NATIONAL OCEANIC AND ATMOSPHERIC ADMINISTRATION (NOAA)

Accomplishments and Initiatives

The National Oceanic and Atmospheric Administration (NOAA) has cooperative activities with the PRC under Protocols in Atmospheric Science and Technology and in Marine and Fisheries Science and Technology, both signed in Beijing in May 1979. In atmospheric science, NOAA works with the PRC Central Meteorological Bureau (CMB). The third Joint Working Group meeting, held in Washington November 5–18, 1981, recognized that various agencies such as the National Science Foundation and PRC Academy of Sciences are participating in the activities under the Protocol in addition to the original parties to the agreement, and that other agencies may become involved in future activities. In marine sciences, NOAA works with the PRC National Bureau of Oceanography; in fishery science, with the PRC Bureau of Aquatic Products.

Activities under the Atmospheric Protocol have included the following:

Establishment and joint operation of an upper/air sounding facility in China since June 1979.

One-year on-the-job study for 13 PRC scientists at various NOAA facilities. In 1981 these have included four at the National Earth Satellite Service, Suitland; two at the National Meteorological Center, Suitland; three at the Environmental Research Laboratories, Boulder; one at the National Hurricane Center, Miami; one at the National Severe Storms Forecast Center, Kansas City, and two at the Environmental Data and Information Service, Washington, D.C.

At the November 5–18, 1981 meeting of the Atmospheric Working Group established under the Protocol, two annexes (V and VI) were signed. Annex V enables CMB to obtain applications software for the processing of polar orbiting satellite data and for the production and evaluation of products from that data, and to allow NOAA to use this sofware in its work. Annex VI specifies the cooperative programs in the near future. The Joint Working Group agreed to include the following new cooperative programs: (1) comparison studies of climate and agriculture of the North China Plain and the U.S. Great Plains regions, (2) monsoon research, (3) Tibetan Plateau/Rocky Mountain effects on atmospheric circulation, and (4) reconstruction of past climate using historical and proxy data.

Under the Marine and Fishery Protocol, activities have included:

Three oceanographic cruises were conducted in the Yangtze River estuary and in the East China Sea in 1981. These included the cruises during higher runoffs (July 23–August 15, 1981) and lower runoffs (November 15–December 5, 1981) periods and a geophysical survey in November 1981.

Exchange of oceanographic data obtained during the first joint US/PRC oceanographic cruise which took place in June 1980.

A third meeting of the Joint Working Group on Marine and Fishery Science and Technology cooperation is being planned for early 1982 to negotiate bilateral activity plans for 12–83. Probable activities would include training in marine data center design and operations, aquaculture projects, marine environmental service development, and a 1982 Symposium on the sedimentation dynamics study, and visiting scientists exchanges for longer term studies in marine science at U.S. institutions.

Science and Technology Benefits to the United States and Other Parties

Under the Atmospheric Protocol.—By bringing together meteorological experts and engaging in cooperative research programs, the U.S. gains access to data which, heretofore, has been sparse and restricted from international use. The upper-air soundings received in the U.S. from the Chinese facility are being incorporated into data bases at the National Meteorological Center in Suitland, Maryland. The U.S. anticipates that this cooperation will lead as well to greater access to Chinese climatological data in the near future.

Visits and on-the-job training concerning meteorological satellite data are primarily designed to train PRC personnel in the processing of meteorological satelite data products. This training will help the Central Meteoroligical Bureau in the production of satellite data products at the Beijing meteorological satellite receiving station, which is eventually expected to provide meteorological data products of use to the U.S. Two U.S. companies, one under contract with the U.N. and one working directly with the PRC, are expected to benefit commercially from the work on the meteoroligical satellite receiving station being installed by the PRC Central Meteorological Bureau.

Under the Marine and Fishery Protocol.—The objective of the exchange is to develop scientific and technical information of mutual value in the fields of oceanography and fisheries from both research and development and the operational aspects. These include functional activities such as marine data exchanges, geophysical studies of the shelves of the China Sea, collaborative studies of the western Pacific circulation (i.e., Kuroshio Current *et al.*) which are climate-related, studies of fish productivity and utilization of living resources, and environmental satellite applications.

To achieve the objective, there are team exchange visits associated with the several technical projects and oceanographic cruises where U.S. scientists work with the Chinese aboard their vessels. Mutual exchanges of data and information derived from the studies of data are included in the program.

DEPARTMENT OF COMMERCE, NATIONAL BUREAU OF STANDARDS

Accomplishments and Initiatives

The cooperative program between the National Bureau of Standards and the State Bureau of Metrology of the People's Republic of China was very active during the past year. Perhaps the most significant action has been the extension of the program of cooperative activities for an additional three years. An annex to the Protocol for Cooperation was signed on May 5, 1981, by NBS Director Ernest Ambler for the Department of Commerce and by Minister Li Leshan for the State Bureau of Metrology, defining a set of activities for the next three years. This annex covers the remaining period of validity of the Protocol which was signed May 9, 1979, for a period of five years. The continuing program calls for Chinese scientists sponsored by SBM to work in NBS laboratories for periods of six months to two years and for NBS specialists to conduct two to three-week lecture tours in China. The parties also agreed to explore the feasibility of exchanging national standards for intercomparison and of organizing joint research projects.

NBS also receives Chinese scientists for long-term research assignments under the general agreement for exchange of scholars and students. During 1981, ten Chinese scientists have worked at NBS for four months or longer.

Science and Technology Benefits to the United States

At this time, the flow of technical information is primarily toward the Chinese side, but NBS receives significant benefits from having competent scientists available for extended periods. The level of sophistication of Chinese research is rapidly increasing, and NBS expects that in the near future much Chinese work will have reached the forefront of scientific knowledge. Therefore, the present relations are an investment for the future.

Goals

NBS long-term goals are to establish a framework for cooperation with both the State Bureau of Metrology and the Chinese Academy of Sciences. NBS work overlaps with responsibilities of both of these organizations, and we expect that durable cooperation will be of value for both sides. Also, as with other countries, many of the people with whom we deal through bilateral arrangements also participate in multilateral intergovernmental organizations (e.g., Treaty of the Meter, OIML) and friendly and cooperative personal relationships established bilaterally carry over into the intergovernmental forum.

Special Problems

The main problem encountered by NBS is the marginal knowledge of English of some of the persons sent to our laboratories. Officials of the State Bureau of Metrology are well aware of this problem and have established special English language courses so that future guest scientists will not have this handicap. The Chinese scientists now in residence at NBS are more proficient in English than the first group that we received.

DEPARTMENT OF THE INTERIOR, BUREAU OF RECLAMATION

Accomplishments and Initiatives

From April 29 to June 12, 1981, the Bureau of Reclamation sent a ten-man team to China to review the proposed Three Gorge Project on the Yangtze River. Two specialists from private engineering firms were included on the team. The Three Gorge Project has the potential of being the world's largest hydropower development. The Bureau team concluded that the project warranted additional investigation and suggested that a comphrehensive feasibility study be undertaken and directed toward a realistic multipurpose concept. The study would use U.S. approaches to economic evaluation and would include social and environmental considerations. The Chinese Ministry of Water Conservancy accepted the team's suggestions and indicated that it would like to have the Bureau of Reclamation provide advisory assistance to the Yangtze Planning Office which would have full responsibility for doing the work.

The only activity remaining for the Three Gorge Project under Annex 1 of the relevant Protocol is for the Bureau and the Ministry of Water Conservancy to meet and discuss future cooperative activities. An invitation was extended by the Commissioner of the Bureau of Reclamation to the Minister of Water Conservancy to meet in Washington, D.C., but as of late 1981 no date has been established. The activities associated with the Ertan Project were: (1) a visit to the United States of a five-man Chinese delegation from January 21 to February 19, 1981; and (2) a six-man Bureau of Reclamation team to China from October 11 to November 21, 1981. A meeting between the Bureau and the Ministry of Electric Power to discuss further activities will be planned after the U.S. team reports its findings.

Science and Technology Benefits to the United States

There is an enormous potential for the sale of U.S. equipment, materials, machinery, and services on the large hydropower projects in China. On the Three Gorge Project alone, it could amount to hundreds of millions of dollars. In addition, the technical experience gained by the U.S. participants will benefit domestic activities both now and in the future.

Goals

The activities outlined in Annex 1 of the Protocol are for the most part completed. The Chinese have indicated a desire to negotiate a second annex to cover the next two or three years.

Retrenchments in PRC scientific and technological activities during the past year have also been reflected in the approach to hydropower development. The emphasis is now on projects within more narrow limits of available resources and the PRC has become very selective about where it puts its limited resources. The Chinese are planning only one new start in the next three years, and both the Ministry of Electric Power and the Ministry of Water Conservancy are looking for new approaches to economic evaluation and analyses of their water resource projects.

The activities under a new annex would probably concentrate on project planning with a strong emphasis on economics. The Bureau would suggest a new program for construction management since we feel this is one of the most deficient areas in the Chinese development activities.

All of the Bureau's involvement to date has been funded by the Trade and Development Program Office of AID. We feel this is appropriate and would hope that additional funding would be made available for the Annex 2 program.

NUCLEAR REGULATORY COMMISSION

Accomplishments and Initiatives

The Nuclear Regulatory Commission and the PRC State Scientific and Technological Commission signed a five-year Protocol on Cooperation in Nuclear Safety Matters on October 17, 1981 at the close of the Second Meeting of the US-PRC Joint Commission on Scientific and Technological Cooperation held in Washington, D.C.

Science and Technology Benefits to the United States and Other Parties

This Protocol sets up channels for the prompt and reciprocal notification of reactor safety problems which could affect both the United States and Chinese nuclear facilities.

Goals

The long-term goal of this Protocol is to help develop a full-scale nuclear safety bank on which all can draw to ensure the continued safe commissioning and operation of nuclear reactors throughout the world.

DEPARTMENT OF TRANSPORTATION

The Department of Transportation officials met in Washington September 25—October 1, 1981, with a delegation from the People's Republic of China Ministry of Communications to continue discussions of a possible protocol in the field of transportation. There were further discussions of a draft protocol, and the PRC side has received a new U.S. draft. In view of the constraints, particularly on funding on both sides it was agreed that initially cooperation would be quite modest consisting primarily of information exchanges. The Department of Transportation looks in the coming year toward accelerating negotiation leading toward concluding the proposed Transportation Protocol and toward the beginning of a formal program of cooperation thereunder.

DEPARTMENT OF HEALTH AND HUMAN SERVICES

Accomplishments and Initiatives

The US-PRC Protocol for Cooperation in Medicine and Public Health has been in effect since June 1979. Ten areas have been identified, thus far, for cooperation under the official program:

Infectious and parasitic diseases;
Cancer;
Cardiovascular diseases;
Public health and health services research, child health and nutrition; and evironmental and occupational health;
Medical information science;
Immunology;
Medical genetics;
Mental health;
Food and drugs, including pharmacology;
Reproductive physiology and family planning.

The Second Joint Health Committee Meeting was held in November 1980 in Beijing. Among the activities agreed were a program of testing hepatitis B vaccine in China and a major epidemiological study of cardiovascular disease in selected populations in China.

In the areas of Public Health and Health Services Research, a pilot project was undertaken in Shanghai County in 1981 in which a descriptive analysis of the primary health care system was conducted by a joint U.S. and PRC team. The findings were reviewed during a joint workshop held in Shanghai in June. A Chinese team visited the United States for seven weeks in late 1981 to begin a reciprocal analysis in an area of Maryland.

Science and Technology Benefits to the United States and Other Parties

Joint activities under the U.S.-PRC Health Protocol are proceeding well. The cross-fertilization of scientific thinking is expected to produce significant results in the areas under study. In some cases (e.g., hepatitis B vaccine development) the collaboration is expected to accelerate work now going on in the U.S. Research in other areas will add to our knowledge and will provide insight into possible means of dealing with particular health problems.

Goals

The short-term goals of this program are to develop and implement activities in all ten areas of cooperation. These activities may take a variety of forms such as exchanges of scientists, data, information and scientific materials; training; or joint research. Longer-term goals include prevention and/or control of particular diseases or health problems, improving health services, increasing our understanding of fundamental immunological processes, improving methods of handling medical information, developing more effective and safer methods of family planning, and other goals directly related to the agreed substantive areas.

It is clear that there are many opportunities for collaboration with the PRC in the health field. The Department of Health and Human Services believes there will be a gradual enhancement of this program as it evolves over time, but within the context of current U.S. fiscal constraints.

DEPARTMENT OF HOUSING AND URBAN DEVELOPMENT

Accomplishments and Initiatives

On October 17, 1981, HUD Secretary Samuel R. Pierce, Jr., signed a Protocol on Building Construction and Urban Planning with the PRC State Capital Construction Commission. Mr. Zhao Wucheng, Vice-Minister of the SCCC, signed for the PRC side.

After signing and after discussions with HUD and GSA Public Buildings Service officials in Washington, Vice-Minister Zhao and five other Chinese officials had discussions with architects, planners, local government officials and business leaders in Baltimore, New York, Houston and San Francisco between October 17 and 24. Topics of particular interest to the Chinese delegation included the redevelopment of older cities, the design and construction of residential buildings, and the manufacture and use of both concrete block and plastic materials in construction.

Science and Technology Benefits to the United States and Other Parties

Benefits to the U.S. will include increased understanding of the urbanization process in China—information that will be useful to both private business (architecture/engineering firms, materials suppliers, etc.) and to researchers working in comparative urban studies. Benefits to the PRC involve greater access to U.S. construction technology and planning methods.

Goals

The main goal of this program is to facilitate exchange of research and experience between both public and private organizations concerned with urban affairs in the two countries.

DEPARTMENT OF INTERIOR, NATIONAL PARK SERVICE

The National Park Service activity is called for within a proposed Annex on Preservation of Nature under the Environmental Protocol to the Science and Technology Agreement. A significant number of professional publications have been sent to Chinese forestry and research officials and communications are continuing. Further activity will depend upon expression of Chinese interest as demonstrated by their agreement to and signature of the proposed annex.

DEPARTMENT OF AGRICULTURE

Accomplishments and Initiatives

The entire range of USDA activities in the PRC supports scientific and technical exchanges between the two countries. In 1981, 24 teams shared information, ideas, specimens and germplasm. The U.S. scientists are chosen from various USDA agencies and U.S. universities. Private industry representatives participate when appropriate. Other vital program areas include: joint, long-term cooperative activities; scholar exchanges; and conferences and symposia, which are coordinated and implemented by the Office of International Cooperation and Development (OICD). Additionally, trade and cooperator activities are coordinated through USDA's Foreign Agricultural Service.

OICD provides assistance to other USDA agencies in establishing, expanding or completing projects in or with China and also becomes involved with information exchange among scientists and scholars in the United States. For example, a recent Cornell conference on agriculture in China will publish a report, supported in part by OICD. Plans are being developed for publishing, on a regular basis, scientific reports written by U.S. exchange teams to China.

Following are brief summaries of major activities in OICD's China Program in 1981:

The Soil Management and Productivity Team studied soil management systems and practices for the control of water and wind erosion; observed practices for the building and maintaining productivity in several eroded, heavily disturbed, and intensively cultivated soils, studied uses of crop residues, organic wastes, composting, and farm biogas production; and studied soil survey status and methods and applicability of U.S. soil taxonomy.

The Water Use and Management Team investigated irrigation, drainage, erosion and sediment control. The specific areas of interest were sources of water, distribution systems, types of irrigation, apportionment practices and controls, drainage practices, and the interrelationships between drainage, irrigation and salinity controls planning, design installation and maintenance of practices used to control erosion, and the control and management of sediment.

An Agreement was signed between USDA's Federal Grain Inspection Service (GFIS) and China's General Administration of Commodity Inspection (CGACI) on August 30, 1981, outlining the manner in which the two countries could conduct cooperative inspection on grain shipments to China.

An Agricultural economics team studied the PRC commune system in May and participated in the return visit of a Chinese team concerned with U.S. agricultural decision-making processes.

A bilateral agreement is being prepared between the Office of Transportation and the China Ministry of Cereals to survey the PRC physical distribution systems that are designed to handle the movement of agricultural products.

Procedures to continue cooperation between the PRC Ministry of Forestry and the U.S. Forest Service were agreed upon in regard to the exchange of correspondence and literature, exchange of biological materials and specimens, exchange of scientists and students, and the establishment of cooperative research projects. During a visit to China, an in-depth technical evaluation of forest genetics was made, and arrangements for joint seed collections and joint research project planning were initiated. During 1981, approximately 34 kilograms of experimental seeds were exchanged.

Assistance was provided to the International Communication Agency in the final preparation and opening of a technical exhibit on U.S. Advances in Crop Insect Control. The exhibit will be permanently housed in Beijing after several short exhibitions at Chinese universities.

As a part of team exchanges, Chinese agricultural machinery management and utilization was evaluated with focus on research and investigation.

Exchanges involving USDA scientists and the American Soybean Association took place in 1981. A U.S. team visited China to examine soybean germplasm and biological control of soybean pests.

Science and Technology Benefits to the United States

Few countries can match China's long history of water husbandry. Large and complex irrigation systems installed 2,000 years ago are still in use, and recent structural changes and additions conform to basic plans and operations that have been proven technically sound through the centuries. China has a rich tradition of water management, and it continues to give high priority to irrigation, drainage, flood control and navigation.

The classification systems for paddy soils and studies of their formation processes and unique properties offer further development of the U.S. systems of soil taxonomy.

Mutual exchanges of data would assist in isolating problem areas in handling of grain. This would materially affect the quality of the grain for storage or processing, establish grading factors relevant to the end use, and improve the distribution of the grain.

The mutual understanding of structures, systems, and workings of each country's agriculture has been quite limited. Through exchanges, much knowledge and information on Chinese agriculture was obtained by the United States. These data are valuable for assessing the current agricultural situation and its influence on U.S. farm exports to China. It also significantly enhances U.S. ability to conduct in-depth research on the structure of and the forces influencing Chinese agricultural production, distribution, consumption and trade.

In striving for modernization in agriculture, China has moved towards more reliance on market forces in regulating the supply and demand of agricultural commodities and inputs. Ignorance of the workings of a market mechanism has led to mistakes, confusion and frequent readjustment in the past three years. Therefore, the

better the understanding of how U.S. agriculture and market economy works, the more China can be a full partner in the world economic community. This will in turn increase the potential for expansion of economic relationships with the U.S., as seen, in part, by the rapid growth of U.S.-PRC agricultural trade in the past three years. The bilateral agreement between the Office of Transportation and the China Ministry of Cereals will further contribute to the orderly flow of agricultural commodities between the two countries.

Information on biological control in China of forest pests is of continuing importance. The acquisition of new plant materials of rare and unique tree species will be invaluable in strengthening U.S. disease-resistance breeding programs.

China is the natural habitat of wild and cultivated soybeans. Their soybeans are 8% richer in protein than U.S. soybeans. The potential benefits from germplasm and information exchange could mean improved soybean yields and an eventual increase in soybean trade.

DEPARTMENT OF THE INTERIOR, U.S. GEOLOGICAL SURVEY

Accomplishments and Initiatives

At the first meeting of the U.S.-PRC Joint Commission on Scientific and Technological Cooperation in 1980 the U.S. Geological Survey (USGS) signed protocols for cooperation in earthquake studies and in earth sciences. At the second meeting of the Joint Commission in 1981, an additional protocol for cooperation in surface water hydrology was signed between the USGS and the Bureau of Hydrology of the Ministry of Water Conservancy.

Two of the seven annexes to the Earthquake Studies Protocol (which is between the USGS and the National Science Foundation (NSF), on the U.S. side and the State Seismological Bureau of the PRC) deal with earthquake prediction and geological studies of active faults, and are primarily the responsibility of the USGS. Under these annexes, projects have been started to improve seismic monitoring in the Beijing area; to study earthquake repeat-intervals in eastern and Southwest China; to make siesmic, geodetic, and magnetic observation in southwest China for the purpose of earthquake prediction; and to exchange data on geochemical earthquake precursors. Ten USGS employees have spent some 40 person weeks in China in connection with these projects, and a similar number of Chinese scientists have come to the United States. Five scientists from universities have contracts with USGS to work in China on seismology or fault studies.

The Earth Sciences Protocol is between USGS and the Chinese Academy of Geological Sciences of the Ministry of Geology. During 1980, the Working Group established under the Protocol identified 20 cooperative projects. The second session of the Working Group met October 15–21, 1981, and approved the initiation of seven projects to be implemented during 1982–83. These concern such topics as: exploration and analysis of uranium deposits, coal basins, and petroleum basins; relationships of volcanism to metallogeny; general nature and occurences of petroleum in carbonate rocks; geologic and tectonic framework of the Circum-Pacific region; and the effects of natural geochemical environments on public health. On October 28, 1981, three annexes to the Earth Sciences Protocol were approved by the Working Group Co-Chairmen. The USGS Director signed them on October 29 and they have been sent to China for signature by the Deputy Chief of the Foreign Affairs Bureau, Ministry of Geology. NSF has agreed to become an active participant in future Working Group activities. Non-USGS geoscientists are expected also to join project activities.

Science and Technology Benefits to the United States and Other Parties

The People's Republic of China covers a tremendous area of underdeveloped natural resources. The exchange of scientific research and technological methods can only promote better understanding of these natural phenomena.

In earthquake studies, the Chinese have had success in predicting major earthquakes. In the case of the Haicheng Earthquake on February 4, 1975, successful prediction and evacuation saved a sizable number of lives. It is apparent that research done in China can significantly contribute to the U.S. Earthquake Hazards Reduction Program.

Goals

Short-term: Cooperative work with the People's Republic of China will enable USGS scientists to get a first-hand look at the geology and science of China.

Long-term: In the field of earthquake prediction, application of Chinese methods for successful prediction of earthquakes is instrumental in understanding earthquakes as well as minimizing the disastrous results of earthquakes.

Changes

As now envisioned, the three Protocols will involve some 31 different projects and more than 100 scientists over the next several years. On the Chinese side, eight major agencies and some two dozen subsidiary institutes or bureaus are participating.

DEPARTMENT OF ENERGY

Accomplishments and Incentives

Cooperation with the PRC has progressed steadily in the areas of high energy physics and hydroelectric power development, and is under negotiation in the areas of magnetic fusion and nuclear physics research, as well as in fossil and nuclear energy research and development technology. Energy working group meetings were held in the areas of high energy physics, hydropower and fossil fuel energy during the October 1981 meeting of the U.S.-PRC Joint S&T Commission.

In the area of high energy physics the Chinese changed the scale of their funding for this work in the Spring of 1981 due to readjustments in their national economy. The focus of the PRC work has changed from that of constructing a 50 GeV Proton Synchrotron (BPS) to the construction of an electro-positron storage ring with an energy of approximately 2.5 GeV per beam. DOE laboratories involved in the cooperative program in high energy physics are the Fermi National Accelerator Laboratory (Fermilab), Stanford Linear Accelerator Laboratory, Lawrence Berkeley Laboratory, Argonne National Laboratory, and Brookhaven National Laboratory. Activities under the Implementing Accord are reviewed periodically by a Joint Coordinating Committee, which makes recommendations to each government on the course of the cooperative effort.

DOE's role in the U.S.-PRC Hydropower Protocol has been that of a coordinating agency. Work under the Protocol is conducted on the U.S. side by the Army Corps of Engineers, the Tennessee Valley Authority, the Bureau of Reclamation, and the Bonneville Power Administration. During 1981, two U.S. delegations traveled to China under the Protocol to review the economic feasibility and the engineering design and construction of the Three Gorges Project and the Ertan Project. In addition, one Chinese delegation has traveled to the U.S. to tour research facilities and institutions working in water resources development. It is anticipated that activities under Annex I will be completed in the near future and that negotiations will begin on a second Annex early in 1982.

During the October Joint Commission meeting the Fossil Energy Working Group reviewed the fossil energy program, plans and priorities of the respective fossil energy programs of each country. The U.S. and the PRC are currently exploring potential for cooperation in the areas of: coal mining, oil shale technology, fluidized-bed combustion, coal-oil coal-water mixture technology, and coal-slurry pipelines. The two sides will continue to exchange more detailed information regarding their research and development activities in these areas. In addition, DOE is awaiting comments from the PRC regarding proposed cooperation in the magnetic fusion and nuclear physics research, and is considering the appropriate scope and levels of cooperation in nuclear energy research and development technology.

Science and Technology Benefits to the United States and Other Parties

Benefit to the U.S. from cooperation with the PRC ranges from political and commercial to technical. The cooperative activities provide some new scientific technological information of benefit to DOE research and development programs; enables DOE to keep abreast of Chinese plans, priorities and capabilities in the energy field; and serves to stimulate increased sales of U.S. equipment and engineering services and to promote expanded commercial contacts by familiarizing the Chinese with U.S. technology, management and business approaches. An increasing role is envisoned for the U.S. private sector under the hydropower protocol.

Goals

The cooperative activities are meant to support U.S. policies of strengthening bilateral relations by expanding science and technology cooperation with the PRC and to aid the PRC in accelerating the development of their domestic energy resources for their own modernization efforts and, by so doing, to attempt to ensure continued export of Chinese oil to the world oil market.

NATIONAL AERONAUTICS AND SPACE ADMINISTRATION

Activity under the National Aeronautics and Space Administration's (NASA) existing Understanding with the People's Republic of China (PRC) on Cooperation in

Space Technology did not develop into any final contractual arrangements with U.S. industry during 1981. NASA was advised by letter dated December 30, 1980, that, due to financial difficulties China was obliged to postpone further action on procurement of a broadcasting and communications satellite system for "several years." Chinese officials insist that the program is not dead, only deferred; and have said that a decision on its future will be made during 1982.

In regard to the procurement of a Landsat ground station, also called for in the 1979 Understanding, the Chinese Academy of Sciences (CAS) has recently advised NASA of its intention to negotiate a procurement contract with a U.S. firm. CAS has also requested a change from a single integrated station to a split-station configuration, due to radio frequency interference. The request is under consideration.

After the conclusion of the Understanding with the PRC on Cooperation in Space Technology, NASA took the position that consideration of new cooperative undertakings should be predicted on significant concrete progress in implementing the two projects already agreed on. NASA deferred decision on other scientific and technical areas of interest identified by the Chinese and American scientists when the Chinese deferred the procurement of the broadcasting and communications satellite system. During the last Joint S&T Meeting, the Chinese requested NASA to reconsider its proposed areas of interest. NASA has agreed to do so, and the project is now under NASA review.

Following exchange of aeronautics delegations, the Chinese Aeronautical Establishment (CAE), presented drafts of a Protocol and specific annexes detailing proposed cooperative projects for consideration by NASA. The drafts remain under consideration within the U.S. Government.

In response to a NASA Announcement of Opportunity, the Shanghai Observatory of the Chinese Academy of Sciences (CAS) submitted in June, 1981 a proposal for cooperative research in crustal dynamics for the period 1982-86. The proposed research would involve the determination and analysis of earth rotation and plate motion using very long baseline interferometry, satellite laser ranging and optical tracking. The Chinese land mass offers useful locations for such studies. As an initial step, NASA has provisionally acepted the part of the Observatory's proposal dealing with data exchange. A letter outlining the terms and conditions for implementing this cooperative effort was sent to CAS in November, 1981.

NATIONAL SCIENCE FOUNDATION

Accomplishments and Initiatives

In 1981, the National Science Foundation implemented a scientific program with the PRC, based on the U.S. agreement on cooperation in the basic sciences which was signed with the Chinese Academy of Sciences and the Chinese Academy of Social Sciences in December 1980.

A U.S.-China Joint Working Group for Cooperation in the Basic Sciences was established and held its first meeting in Beijing in March, 1981. In order to facilitate participation of scientists from Chinese institutions of higher education in the cooperative program, the Ministry of Education of the PRC is represented on the Joint Working Group.

The Working Group agreed that the program would emphasize cooperative research projects while also co-sponsoring seminars and other meetings designed to stimulate program development. The Working Group also agreed that the program should initially focus on a relatively limited number of fields of science, although all parties expressed the hope that the scope of the program would steadily broaden in accordance with the mutual interests and respective resources of the United States and China.

The initial scope of the program covers projects in: archaeology, astronomy, chemistry of natural products, linguistics, materials science (ceramics, metallurgy and polymers) and systems analysis (decision and management sciences and operations research). Ten projects (some of two years' duration) in those fields were jointly approved and supported in 1981. It is expected that in the short-term future, an annual level of thirty to forty cooperative projects in the basic sciences can be sustained.

Under the National Science Foundation/U.S. Geological Survey Earthquake Studies Cooperative Agreement with China's State Bureau of Seimology which was signed in January 1980, NSF has provided support for research on earthquake faults in China, for the continued deployment to accelerometers in China, and for workshops and joint research projects in earthquake engineering. The progress of the earthquake studies program was reviewed in November, 1981 at a meeting of U.S. and Chinese agency representatives in Washington, D.C.

NSF has maintained its representation on the U.S.-China Joint Working Groups for the atmospheric sciences and the marine sciences and fisheries protocols and is now also represented on the Joint Working Group for the Earth Sciences protocol.

In 1981 NSF continued to provide major support for some of the activities of the National Academy of Sciences' Committee on Scholarly Communication with the PRC, including the U.S.-China algology symposium held in Qingdao in November. NSF has also provided partial funding to the United States International Communications Agency (USICA) to support ten U.S. natural scientists to visit China under the 1978 U.S.-China student/scholar exchange agreement.

Science and Technology Benefits to the United States and Other Parties

Scientific benefits to the United States and the People's Republic of China are expected to be high:

In fields of strong scientific tradition in China (e.g. chemistry of natural products, earthquake studies);

In fields where China provides an important scientific data base (e.g. linguistics, earthquake studies);

In fields where China constitutes a major cultural-specific research environment (e.g. archaeology, linguistics);

In fields where comparative studies play an important role (e.g. linguistics, systems analysis).

Goals

The goal of the activity remains unchanged, that is, to develop a high-quality program which will take advantage of the competence of both sides.

ENVIRONMENTAL PROTECTION AGENCY

Accomplishments and Initiatives

The Environmental Protection Protocol.—The U.S.-PRC Environmental Protection Protocol was signed in Beijing on February 5, 1980, by the heads of the U.S. Environmental Protection Agency (EPA) and the Chinese Office of the Environmental Protection Leading Group (EPO) under the State Council. In May 1980, agreement was reached on three annexes to the Protocol regarding (1) environmental health effects research, (2) pollution control technology, and (3) environmental processes and effects research. The annexes provided for the initial visits and steps toward joint research in these fields. In January 1981, a water quality analyst began 10 weeks' work at EPA's Health Effects Research Laboratory in Cincinnati, the first Chinese specialist to do so under the Protocol, and it is planned that a counterpart U.S. scientist begin his reciprocal work in China in February 1982.

In October–November 1980, a delegation from EPA visited Chinese laboratories and field sites relevant to Annexes 1 and 3 and began the process of project definition. In January 1981, a Chinese delegation in the U.S. under UNDP auspices visited several laboratories and helped to define research projects in the modeling of air pollution transport and transformation. A Chinese proposal regarding research on the health effects of coal combustion has been received, translated, and reviewed. Revised versions of these several proposals are undergoing in-house review for scientific merit and funding.

In May 1980, agreement in principle was also reached on two other areas, namely, (4) environmental impact assessment studies, and (5) preservation of nature. The U.S. side has indicated its willingness to proceed with these activities. The Chinese Ministry of Forestry has taken under consideration a U.S. proposal to send 12 fertile black-necked crane eggs to the International Crane Foundation in Wisconsin, and the U.S. side has offered to visit Beijing for discussions about an equitable division of work, responsibilities, and costs.

Science and Technology Benefits to the United States

We expect to gain access to Chinese facilities, natural conditions, and population groups to collect experimental data which would be more difficult, more expensive, and in some instances impossible to obtain in the U.S. We expect that broader Chinese exposure to American laboratories and companies will enhance U.S. commercial opportunities within the limited but real potential for the sale of equipment and services in the field of environmental protection and pollution control.

Goals

In our work with China, we are attempting to build a network of institutional and personal linkages between the Government, private, and academic research institutions in the two countries; to work jointly with Chinese specialists to develop solu-

tions to environmental problems of mutual concern; to maintain and expand contacts between environmental specialists and organizations in the two countries; and to assist China to develop and maintain appropriate standards of environmental pollution control.

DEPARTMENT OF COMMERCE

Accomplishments and Initiatives

The Department of Commerce and the PRC State Scientific and Technological Commission (SSTC) signed the Protocol of Cooperation in the Fields of Management of Science and Technology and Scientific and Technical Information in May 1979, a few months after the conclusion of the bilateral Agreement on Cooperation in Science and Technology. The most significant activity under the protocol has been the establishment of the National Center for Industrial Science and Technology Management Development (NCISTMD) at Dalian, China, to provide executive training for senior-level Chinese managers, officials and university professors. The US provided a team of American management experts to staff the Center and US companies contributed computer and other business-machine equipment, as well as supporting staff. The US also provides support in curriculum design and preparing course contents. The Center has received high priority from the PRC leadership and the Chinese Government has borne two-thirds of the project costs. The first session ran for 18 weeks in 1980 with 170 Chinese participants and the second session with 185 participants ran from June through October 1981. In late 1981 the PRC began a major construction program to provide new physical facilities for the Dalian Center.

In addition to the support for the Dalian Management Center, the Department of Commerce arranged during 1981 a 45-day on-site survey and training tour of the US machine tool industry by a Chinese delegation; a joint symposium on systems engineering in Xian, China; and a series of lectures on industrial management in China by US professors. In the area of scientific and technological information, a working relationship has been established between the National Technical Information Service (NTIS) of the Department of Commerce and the Institute of Scientific and Technological Information in China (ISTIC), involving a continuing exchange of reciprocal acquisition of publications and training of ISTIC technicians at NTIS. Two ISTIC personnel are now at NTIS for a year-long program.

Science and Technology Benefits to the United States and Other Parties

The Dalian Center is a long-term project whose benefits will accrue slowly. But through it—and its influence on senior Chinese managers—the US can contribute to Chinese modernization efforts and to directing those efforts in ways that reap the benefits of soundly managed science and technology. The benefits in turn to the US can be substantial, both terms of commercial prospects and in cultivating positive attitudes toward the US. The same conclusions have apparently been reached by other governments: a number have watched the Dalian project carefully and made plans to emulate it elsewhere in China.

APPENDIX II. COMMENTARIES PREPARED BY THE CONGRESSIONAL RESEARCH SERVICE

1. BACKGROUND FACTS ABOUT EAST-WEST TRADE*

1. BACKGROUND [1]

United States trade turnover with the U.S.S.R. dropped from a high of $4.5 billion in 1979 to $2.3 billion in 1983. Bilateral trade has been predominantly agricultural, with insufficient Soviet exports to balance the trade. (See tables I and II.) Although in 1983 grain represented approximately 70 percent of all U.S. exports to the U.S.S.R., the U.S. share of total Soviet grain imports was only about 34 percent. This represents a loss of about 40 percent in the U.S. share of the Soviet grain market since 1976.

As the volume of U.S.-Soviet trade has decreased considerably over the last several years, due in the main to decreased American grain exports, Soviet trade with other members of the OECD and other Western grain exporting nations has not. OECD trade with the Soviet Union has for the most part not been affected by the recent fluctations in the political climate of East-West relations, although the worldwide recession has been a negative factor.

The prospects for future American agricultural trade with the U.S.S.R. depend on the results of Soviet harvests and developments in bilateral policy. With the signing August 25, 1983 of a new Long-Term Grain Agreement (LTA), higher annual levels of (9–12 million metric tons (MMT) total) U.S. wheat, corn, and soybean exports to the U.S.S.R. are assured for 1983–88. A favorable international grain market situation for the U.S. and improved U.S.-Soviet relations could provide the basis for further trade expansion in cereal and feed grains and soybeans.

Even in 1983, a rather cool year in U.S.-Soviet relations, the U.S. offered to sell the Soviets 22 MMT of grain, although improvements in the 1983 Soviet grain crop (approximately 190 MMT according to General Secretary Chernenko) and commitments to other suppliers prevented them from buying nearly this amount. Soviet purchases for the first year of the new LTA totaled approximately 10.4 MMT. However, a particularly poor harvest (estimated at 170 MMT by the USDA), caused primarily by bad weather, has forced them to buy more U.S. grain. As Soviet LTAs with other nations expire, they could continue to increase their purchases of U.S. grain. Their buying patterns notwithstanding, the Soviets are thought to prefer U.S. grain over that of other suppliers because of its quality and quantity.

Significant agricultural equipment and technology imports required by the Soviet "Food Program" represent another area of possible U.S. export augmentation. In October 1983, over 100 companies attended the first U.S. agribusiness show in Moscow in over six years. Known sales resulting from this show are in excess of $5 million.

Any increases in non-grain agricultural trade will be influenced by changes in trade legislation (i.e., revisions in the 1979 Export Administration Act), as well as in overall bilateral relations because, unlike grain exports, contract sanctity for products of this kind is not covered by the LTA.

U.S. non-agricultural trade with the U.S.S.R. is primarily not high technology, state-of-the-art trade. The bulk of this trade is generated by American comparative advantages in time, quantity, and quality. Energy equipment, such as pipe, compressors, pipelayers, related to gas and oil expansion represent a substantial share of

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[1] For a comprehensive review of U.S. trade policy toward the East see: Vladimir N. Pregelj, "U.S. Commercial Relations with Communist Countries: Chronology of Significant Actions Since World War II and their Present Status," March 30, 1984, *CRS Report* 84-67E.

likely Soviet imports form the West. Generally, such imports are widely available among OECD suppliers. General Electric's lead in the production of heavy turbine rotors for natural gas line compressors—25 megawatt turbines—represented an exception of note during the "pipeline dispute" of 1981–82 and is likely to be short-lived as Soviet production and alternative Western supplies expand and become more competitive.

TABLE 1.—TRADE OF SELECTED INDUSTRIAL COUNTRIES WITH THE EASTERN TRADING AREA, BY COMMODITY GROUPS, 1973, 1981, 1982

[Billion dollars, exports f.o.b., imports c.i.f.]

	Exports to—									Imports from—								
	U.S.S.R.			Eastern Europe			China			U.S.S.R.			Eastern Europe			China		
	1973	1981	1982	1973	1981	1982	1973	1981	1982	1973	1981	1982	1973	1981	1982	1973	1981	1982
UNITED STATES																		
All commodities	1.19	2.36	2.59	0.92	1.90	1.01	0.69	3.60	2.90	0.22	0.35	0.24	0.32	1.32	0.92	0.06	2.06	2.50
Primary products	.93	1.77	1.99	.66	1.64	.74	.61	2.47	1.86	.19	.23	.09	.14	.43	.30	.03	.84	.98
Food	.92	1.67	1.86	.34	1.46	.59	.47	1.49	1.31	.....	.01	.02	.10	.24	.18	.01	.30	.14
Fuels	.....	.06	.09	.01	.05	.03	.....	.....	.....	.08	.12	.01	.01	.16	.11	.....	.32	.64
Manufactures	.26	.58	.60	.26	.25	.24	.08	1.12	1.04	.03	.13	.15	.17	.89	.61	.03	1.21	1.52
Semifinished products [1]	.04	.22	.30	.12	.10	.09	.01	.55	.62	.02	.12	.14	.06	.28	.12	.01	.16	.18
Engineering products	.21	.32	.24	.11	.14	.13	.07	.29	.29	.....	.....	.....	.05	.30	.19	.....	.09	.12
Textiles and clothing	.01	.02	.01	.02	.01	.01	.....	.28	.13	.....	.....	.....	.03	.14	.15	.01	.71	.93
JAPAN																		
All commodities	.48	3.26	3.90	.52	.76	.58	1.04	5.10	3.51	1.08	1.49	1.31	.26	.23	.20	.97	5.29	5.35
Primary products	.01	.12	.09	.01	.14	.07	.06	.27	.21	1.00	1.34	1.20	.19	.12	.11	.60	4.06	4.15
Food	.....	.....	.....	.01	.01	.01	.....	.01	.01	.03	.09	.09	.04	.06	.06	.26	.68	.60
Fuels	.....	.04	.04	.....	.09	.04	.....	.....	.01	.11	.32	.26	.05	.....	.....	.04	2.94	3.06
Manufactures	.47	3.06	3.71	.49	.62	.51	.98	4.75	3.24	.07	.14	.11	.07	.11	.09	.37	1.21	1.17
Semifinished products [1]	.19	1.67	1.94	.16	.15	.13	.74	1.64	1.85	.06	.09	.10	.03	.06	.04	.07	.48	.42
Engineering products	.19	1.10	1.53	.26	.41	.34	.20	2.67	1.09	.01	.04	.01	.02	.02	.02	.....	.04	.01
Textiles and clothing	.07	.26	.22	.06	.04	.02	.04	.40	.25	.....	.....	.....	.02	.01	.01	.19	.55	.57
WESTERN EUROPE [2]																		
All commodities	3.99	17.77	17.85	7.88	15.84	13.15	.97	2.51	2.50	4.00	24.84	26.00	6.88	15.68	15.25	.80	3.00	2.75
Primary products	.56	3.94	3.10	1.66	4.28	3.00	.20	.43	.38	3.12	22.24	23.30	3.45	7.20	7.05	.50	1.25	1.10
Food	.37	3.10	2.35	.81	2.50	1.55	.01	.13	.14	.16	.17	.17	1.80	1.71	1.60	.23	.62	.50
Fuels	.01	.11	.17	.11	.40	.30	.....	.....	.....	1.60	19.78	21.00	.69	3.71	3.85	.....	.07	.06
Manufactures	3.41	13.71	14.40	6.17	11.39	9.90	.77	2.04	2.10	.85	2.55	2.55	3.37	8.40	8.10	.30	1.71	1.60
Semifinished products [1]	1.41	5.78	5.60	2.37	4.72	4.25	.47	.80	.95	.42	1.64	1.65	1.18	3.29	3.30	.10	.40	.35
Engineering products	1.56	5.18	6.45	3.04	5.36	4.45	.28	1.08	1.10	.38	.79	.78	1.10	2.54	2.40	.01	.12	.14
Textiles and clothing	.28	1.47	1.20	.61	.99	.90	.02	.07	.05	.04	.05	.05	.62	1.38	1.35	.14	.85	.80

TABLE 1.—TRADE OF SELECTED INDUSTRIAL COUNTRIES WITH THE EASTERN TRADING AREA, BY COMMODITY GROUPS, 1973, 1981, 1982—Continued

[Billion dollars, exports f.o.b., imports c.i.f.]

	Exports to—									Imports from—								
	U.S.S.R.			Eastern Europe			China			U.S.S.R.			Eastern Europe			China		
	1973	1981	1982	1973	1981	1982	1973	1981	1982	1973	1981	1982	1973	1981	1982	1973	1981	1982
TOTAL OF ABOVE																		
All commodities	5.66	23.39	24.34	9.32	18.50	14.74	2.70	11.21	8.91	5.30	26.68	27.55	7.46	17.23	16.37	1.83	10.35	10.60
Primary products	1.50	5.83	5.18	2.33	6.06	3.81	.87	3.17	2.45	4.31	23.81	24.59	3.78	7.75	7.46	1.13	6.15	6.23
Food	1.29	4.77	4.21	1.36	3.97	2.15	.48	1.63	1.46	.19	.27	.28	1.94	2.01	1.84	.50	1.60	1.24
Fuels	.01	.21	.30	.12	.54	.37	.....	.....	.01	1.79	20.22	21.27	.75	3.87	3.96	.04	3.33	3.75
Manufactures	4.14	17.35	18.71	6.92	12.26	10.65	1.83	7.91	6.38	.95	2.82	2.81	3.61	9.40	8.80	.70	4.13	4.29
Semifinished products[1]	1.64	7.67	7.84	2.65	4.97	4.47	1.22	2.99	3.42	.50	1.85	1.89	1.27	3.63	3.46	.18	1.04	.95
Engineering products	1.96	6.60	8.22	3.41	5.91	4.92	.55	4.04	2.48	.39	.83	.79	1.17	2.86	2.61	.01	.25	.27
Textiles and clothing	.36	1.75	1.43	.69	1.04	.93	.06	.75	.43	.04	.05	.05	.67	1.53	1.51	.34	2.11	2.30

[1] Iron and steel, chemicals and other semimanufactures.
[2] Excluding trade between the Federal Republic of Germany and the German Democratic Republic.

Sources: UN, trade data tapes. U.S. Department of Commerce.

The outlook for future Soviet industrial imports from the U.S. is uncertain. Broad availability of many products and processes, particularly in construction, energy, metallurgy, automotive and related equipment, will mean that many Soviet import choices from the West and Japan will not be made on technological grounds but instead on the competitiveness of export contracts, on the reliability of supply under the terms of the contracts, and on the political relations of the trading countries. If for any political reason the U.S. is considered only a residual supplier, then the other OECD countries might dominate industrial trade with the U.S.S.R. However, the chances of such a situation occurring would be very small if the 1982–83 post-energy sanctions Alliance studies on credit, licensing, and energy resulted in full acceptance of the U.S. position by the other OECD members and subsequently created a unified OECD position.

Currently, U.S. competitiveness and security concerns are especially focused in the electronics industry—computers, micro-electronics, etc.—where "dual-usage," i.e., usage of the same technology for civilian and military purposes, is of particular concern and hence national security controls are most likely.

U.S. trade with the People's Republic of China (PRC) has followed a quite different pattern than U.S. trade with the U.S.S.R. First, the PRC has enjoyed most-favored-nation status (MFN) since 1980, which has provided reduced tariff rates and access to U.S. Government credits, both agricultural (CCC) and Export-Import Bank. More recently, the classification of the PRC for the purposes of export licensing was changed, moving it from a Group P country to a Group V country. (Group V includes all non-Communist countries outside of the Western hemisphere in addition to Yugoslavia). Although this change will allow U.S. exporters to sell a wider range of goods to the PRC without having to obtain special licenses, U.S. controls over exports to the PRC still remain tighter than those on goods sold to other countries in Group V. While in Washington in January 1984, Chinese Prime Minister Zhao Ziyang requested that controls on exports to the PRC be further relaxed by placing the PRC into that category of a "friendly" country for the purposes of export licensing.

2. Commentary

For the United States, commercial relations with the Soviet Union will be influenced, on the one hand, by the Soviet need for U.S. exports and their ability to pay and, on the other, by the U.S. willingness to export and the overall state of U.S.-Soviet bilateral relations. The United States retains a strong comparative advantage in some agricultural exports, e.g., corn and soybeans, and selective industrial machinery and equipment. But limitations on Soviet ability to pay, e.g., their hard currency income from exports of oil, gas and other materials, and the lack of available Western credit suggest caution in predicting bilateral trade prospects.

The U.S. requires licenses for a wide variety of exports of non-agricultural items to the U.S.S.R. for national security, foreign policy, and short supply reasons. The foreign availability of comparable goods and technology, however, has been expanding. Wide diameter pipe, submersible pumps, pipelayers are all examples of American products whose dominant place in the world export market—including the Soviet market—has been reduced to a marginal supplier level (Howard Lewis III, Vice President, National Association of Manufacturers statement in *The Premises of East-West Commercial Relations*, 1983, pp. 28–45).

The use of licensing for foreign policy purposes, e.g., embargoes and sanctions, has led Soviet and other Eastern importers to refer to the United States as an unreliable supplier and, in some cases, has made the United States the supplier of last resort. From the Eastern perspective, the extraterritorial reach of the U.S. Government to foreign affiliates of U.S. companies or foreign companies using U.S. patents as exercised during the 1982 "pipeline dispute" has been a further disincentive to trading with the U.S.

By assuring contract sanctity for grain sales through the LTA, the charge of unreliable supplier was largely met in that area. However, contract sanctity for multi-year capital goods export has yet to be provided and would be necessary for the United States to be considered a reliable supplier in industrial, transportation, and agricultural equipment trade. The U.S. would also have to be more selective about the technologies and products that it bans from export to the U.S.S.R. if its trade with the East were to grow significantly.

The definition of strategic trade, i.e., trade that enhances a country's military posture, has been a source of controversy both within the U.S. Government and the NATO alliance. Disagreements within the current Administration have been most visible between the Department of Defense and the Department of Commerce, with

the former calling for a wider, more comprehensive export control policy. Within the Coordinating Committee for Multilateral Export Controls (CoCom), consisting of all NATO countries plus Japan minus Iceland, it seems that the Europeans do not oppose American proposals for putting new restrictions on some selected high—"top"—technologies but rather are against putting controls on older—even obsolete—technologies which they see as readily available. Some Americans, such as retired State Department official William Root, argue that substantive discussions have and can continue to lead to agreement within CoCom on the licensing of specific military-related products sold to the U.S.S.R., but European acceptance of broadened strategic categories of processes as well as products will not be forthcoming, especially if the Europeans continue to see those new definitions and procedures as being unilaterally imposed by the U.S. (Testimony of William Root before the Committee on Foreign Relations, U.S. Senate, October 26, 1983.)

The Reagan Administration also feels that non-trade transfers of technology—espionage, people-related, scientific communications—have played a a significant role in the qualitative improvement of the Soviet military arsenal. Some would go so far as to say, in effect, that the U.S. defense research establishment supports two programs, its own and the Soviets'. Non-trade technology transfers are not easy to stop. Measures to restrict the transfer that takes place through scientific communication have been discussed within the U.S. scientific community with the general conclusion that security by accomplishment, i.e., a dynamic American technological effort, is preferred to governmental control of scientific communication.

American assertions that weaponry advances in the Soviet military would have been reduced without access—legal and illegal—to Western technology are also questioned by the Europeans who seem to give more attention to the domestic breakthroughs of the Soviet military R & D establishment.

All the Western countries in the OECD except the United States provide the Soviet Union, as well as the CMEA-Six,[2] with tariff privileges (MFN), government credits or guarantees for financing exports, and other means of trade facilitation. Hence, even with comparable quality goods and processes, U.S. exports will invariably be at a comparative disadvantage in the Soviet market. Willingness to engage in industrial cooperation, countertrade, (i.e., barter trade) and other trade facilitating techniques further enhances the attractiveness of U.S. competitors in the Soviet market. Without change in its trade policy or posture, the United States is likely to be primarily, if not solely, a grain trader with the U.S.S.R. Moreover, the United States is likely to continue to have the most unbalanced trade with the U.S.S.R. of any of the Western industrial or grain exporting nations.

West European and Japanese non-agricultural trade with the Soviet Union is likely to expand. Wharton EFA projects Western exports to the U.S.S.R. in the five-year period (1983 to 1988) will increase from $30 to $45 billion. (Wharton EFA, Inc., *Current Analysis,* No. 2, January 7, 1983, p. 2.) Other Western forecasters are less optimistic on trade projections (See Additional Sources). How much East-West trade grows will be determined not only by bilateral trade policies but by the growth of the OECD economies, Eastern bloc debts, high or low interest rates, fluctuations in the price of oil, and other exogeneous factors.

Reaching a workable Alliance consensus on the basic premises of East-West trade may be key to future United States commercial relations with the U.S.S.R. The end of the pipeline sanctions in November 1982 marked the beginning of a consultative process intended to stress consensus in the West and mend the East-West trade policy ruptures in Alliance unity. While removing the ban on the sale of energy equipment to the Soviet Union on November 13, 1982, President Reagan announced the initiation of four Alliance studies:

1. *General Study.*—Undertaken within the NATO Economic Secretariat, Brussels; Ministerial Agreement, May 1983, Ministerial Communique. Detailed, follow-on defense studies now underway.

2. *Energy.*—Undertaken within the International Energy Agency (IEA), OECD, Paris. Concluded in June 1983. IEA continues consultation and monitoring of subject.

3. *Strategic Trade.*—Undertaken within the Coordinating Committee for Multilateral Export Controls (CoCom), Paris. Continuing. Issues and agenda widely discussed in detail.

4. *Credit.*—Undertaken within the OECD, Paris. Continuing.

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[2]The CMEA-Six includes Bulgaria, Czechoslovakia, East Germany (GDR), Hungary, Poland and Romania.

In May 1983, in Williamsburg, the seven heads of State included in their communique:

> East-West economic relations should be compatible with our security interests. We take note with approval of the work of the multilateral organizations which have in recent months analyzed and drawn conclusions regarding the key aspects of East-West economic relations. We encourage continuing work by these organizations, as appropriate.

Some general, continuing questions are identifiable in the four Alliance studies, and some initial progress is observed:

(1) *Are Eastern growth gains a basis of cooperation or continued competition?* Agreed definition of the security issue is necessary in answering the fundamental economic/security questions. Specific detailed studies are being used for developing a broader common policy and a common course of action.

(2) *Are European gas imports from the Soviet Union sources of vulnerability or security?* Agreement has been reached on the need for energy supply diversity. Norwegian gas supply and "safety net" are considered the keys to energy market security. So far in the 1980s, the "safe" oil-gas supplies of a soft energy market have given leverage to Ruhrgas—the monopsonist—rather than the oil-gas exporting oligopoly—the Soviet Union. But agreement is still lacking on the available means to obtain "secure" (e.g., Norwegian) sources as an offset to dependence on Soviet gas until the mid or late 1990s.

Some of the basic recommendations of the IEA study have been made public. The *Wall Street Journal* on June 21, 1983 reported that these recommendations include:

> The creation of strategic gas reserves in the 21 member countries of the IEA, which include the U.S., Japan, and most of Western Europe. This undertaking would parallel the large strategic petroleum reserves built up by industrialized nations in the 1970s and now retained to guard against a sudden cutoff of oil supplies.
>
> A yearly review of possible new gas supplies for the West, with an eye to avoiding excessive reliance on a single supplier, most notably the Soviet Union.
>
> A review of the commercial contracts between gas companies and their customers to allow interruptions in case of emergency.
>
> The reinforcement of so-called "dual firing" in factories in IEA countries to permit moving almost instantaneously from gas to oil in case gas supplies are cut off.
>
> The construction of more interconnecting gas pipelines to allow greater sharing among European countries if supplies are cut short.

Again, more consultation, no enforcement of procedures for multilateral courses of action.

(3) *Will there be a unified, multilateral, defense-related licensing policy or unilateral U.S. strategic controls?* Progress has been made on specific product exports through consultation and the refinement of specific definitions. Conflicts, however, have reportedly resulted from the introduction of new, general terminology to deal with ill-defined, unilaterally determined categories. CoCom has little enforcement authority. Results within CoCom have usually come from consensus. Although in July 1984 some compromise on restricting sales of computer hardware, software, and telecommunications was reached within CoCom, the consensus appears to be quite fragile. Within weeks of finalizing the agreement, the French and Germans were reportedly already beginning to look for ways around the new regulations.

A new consensus on strategic controls still eludes the negotiators, but the definition of national security controls adopted in the Corson Report and the procedures outlined by William Root appear to provide potential bases for agreement.

(4) *Will there be Western export financing competition or common credit policy constraints?*

The U.S.S.R. has been shifted to the "advanced country" category meaning that the Soviets are "required" by the OECD member countries to pay a minimum interest rate of 12.15% on short-term credits and a minimum interest rate of 12.4% on long-term credits. Little agreement, however, has been reached on the specific export financing charges of Europe and Japan. An accepted definition of "subsidized" or "preferential" credit and agreement on enforcement are still under discussion.

In the May 1983 OECD Ministerial Communique, the following reference was made to this study:

> This purely economic analysis demonstrates that East-West trade and credit flows should be guided by the indications of the market. In the light of these indications, Governments should exercise financial prudence with-

out granting preferential treatment. Ministers recognized, moreover, that practices connected with the state-trading systems of centrally planned economies can create problems which need to be kept under close examination within the Organization. More generally, they agreed that, in the light of changing circumstances, the Organization should continue to review East-West economic relations.

Additional Sources:

(1) Gregory Grossman, and Ronald L. Solberg "The Soviet Union's Hard-Currency Balance of Payments and Creditworthiness in 1985," RAND Publication Series April 1983.

(2) Hedja Kravalis, "U.S.S.R.: An Assessment of U.S. and Western Trade Potential with the Soviet Union Through 1985, in East-West Trade: The Prospects to 1985, (Washington, D.C.: Govt. Print. Off.), 1982, pp 203–236;

(3) Richard Portes, "Deficits and Detente: Report of an International Conference on the Balance of Trade in the Comecon Countries," The Twentieth Century Fund, 1983.

2. OUTLOOK FOR TECHNOLOGY TRANSFER*

1. Background

Trade with the Soviet Union and Eastern Europe has never played a major role in the U.S. economy. Even in the early and mid-1970s, when the U.S. Government actively promoted trade with the East, U.S. trade with the East was small by comparison with its trade with Canada, Japan and Western Europe.

In the early 1970s, many supporters of expanded commercial relations with the East believed that the Soviet Union and Eastern Europe represented a potentially large market for U.S. exports. In particular, some observers suggested that the complementarity of the U.S. and Soviet economies provided a basis for greater economic interdependence. Soviet importers appeared to have a growing need for U.S. grain and technology and the Soviet economy had the potential to export significant amounts of hydocarbons and other raw materials to the United States.

In the early and mid-1970s, U.S. corporations discussed a number of major joint projects with Soviet and East European authorities, but many of the projects never came to fruition. Only a few U.S. exporters, most prominently grain exporters and manufacturers of selected machinery and equipment, have found significant markets for their goods in the East. Moreover, the Eastern countries have been unable to expand adequately their exports to the United States and other Western countries.

Soviet and East European economic planners appear to value imports of Western technology as a means of spurring modernization of their domestic industries. Since the mid-1960s, the need for Western technology has provided a major impetus for Eastern efforts to expand their economic ties to the West. Many U.S. manufacturers of high-technology machinery and equipment perceive the Soviet Union and Eastern Europe as potentially important markets for their products.

One of the major barriers to U.S. transfers of technology to the East is U.S. export control policy. Some of the technologies that are most needed in the East, such as oil and gas equipment, computers and numerically controlled machine tools, have been subject to strict export controls. Presumably such controls have reduced the volume of U.S. technology transfers to the East.

Even if all export controls were removed, however, Soviet and East European importers may face severe constraints on their ability to import Western technology. Perhaps the most important constraint is their inability to finance needed imports. All of the Eastern countries have chronic shortages of hard currencies because of their inability to produce enough exports that are competitive on Western markets. Moreover, because of the debt servicing problems of Poland and other East European countries, Western creditors are becoming more reluctant to provide loans to the East.

The enactment of the Export Administration Act of 1969 marked a significant shift in U.S. export control policy. Whereas its predecessor, the Export Control Act of 1949 was designed primarily to limit U.S. trade with the East, the 1969 Act was designed to foster such trade so long as it was compatible with U.S. national security, foreign policy and economic interests. The Export Control Act had provided for controls on exports which contributed to the economic and military potential of Communist countries. The Export Administration Act, on the other hand, provided

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for national security controls only on those exports that made a significant contribution to the military power of Communist countries.

The export expansion language of the 1969 Act was strengthened by its successor, the Export Administration Act of 1979. There is considerable controversy about whether the existing Act assigns the proper priority to the sometimes competing goals of export expansion, national security, and foreign policy. The 1979 Act expired during the 98th Congress, and President Reagan invoked emergency powers to continue administering export controls. Consideration of a new law in the 99th Congress provides an opportunity to reconsider the multiple goals of the existing law.

The benefits of international trade are well known. Each participant benefits by exporting goods and services that it produces relatively efficiently and importing goods and services that are produced more efficiently abroad. The principle of comparative advantage suggests that an expansion of trade will lead to the growth of export industries and new employment opportunities.

The U.S. economy receives the benefits of comparative advantage when it trades with any country, including the Soviet Union. There is a cost, however, in trading with a potential adversary. Soviet imports from the West contribute to greater Soviet economic power. Because economic growth and modernization contribute to military power, the Soviet military may gain indirectly from expanded trade with the West. The Soviet military may also gain directly if it succeeds in importing technologies with military applications. U.S laws and regulations concerned with export controls are designed to assure the maximum economic benefits of trade with the East and minimize the costs related to U.S. national security.

The costs and benefits of East-West trade are difficult to measure with precision, and various observers have reached different conclusions about the advisability of trading with the East. Nevertheless, judgments about costs and benefits of such trade are a necessary part of making decisions about export controls.

2. Commentary

Since 1969, U.S. export control laws have stated that it is the policy of the United States to restrict the export of goods and technologies "which would make a significant contribution to the military potential" of possible adversaries. [Export Administration Act of 1979, P.L. 96–72, Sec. 3, Paragraph (2)(A)] In enacting the Export Administration Act of 1969, the U.S. Government changed significantly its export control policy. Prior to 1969, the Export Control Act had restricted most trade with the Soviet Union and other potential adversaries: it had barred exports that made a contribution to either the military or the economic potential of such countries. A central purpose of the EAA 69 (and its successor the EAA 79) was to limit the application of export controls to militarily significant exports. The Act was intended to promote non-strategic or non-military trade with all countries.

In its response to questions about the long-term outlook for U.S. sales of technology to the Soviet Union and Eastern Europe, the Reagan Administration uses language to describe U.S. export control objectives that is different from that used in the Export Administration Act. The United States, according to the Administration's response, "seeks to restrict the flow of critical Western Technology to the Soviet Union that could contribute substantially to the improvement of Soviet military capabilities either directly or indirectly by strengthening defense-priority industries."

The Administration's language appears to reflect a broadening of the category of technologies subject to export controls. Critics of the Administration's approach have maintained that the application of U.S. export controls to goods and technologies that only indirectly contribute to Soviet military potential is not consistent with the EAA. (James H. Giffen, Senate Banking Committee, Reauthorization, p. 538.) Some U.S. allies are also opposed to more restrictive criteria for export controls: they have generally resisted the Administration's attempts to include more items on the list of multilaterally controlled goods and technologies. Some members of CoCom have preferred to limit the list of controlled items to those technologies that directly contribute to Soviet military power. (Statement of Angela E. Stent in *Premises*, 1983, p. 160.)

The response suggests that the pursuit of this objective represents a change in the U.S. export control system—a tightening of restrictions on high technology exports to the Soviet Union and decontrol of products at the lower end of the technology spectrum.

The Administration is not specific about what kinds of technology transfers are likely to be controlled more tightly. For example, it neither specifies which technologies could contribute substantially to Soviet military capabilities nor defines "de-

fense-priority industries." The response does suggest, however, that relatively little trade will be affected. In recent years, according to the Administration, high-technology products have accounted for only 5 percent of total U.S. exports to the Soviet Union and Eastern Europe. Approximately 70–80 percent of U.S. sales to the Soviet Union and Eastern Europe consist of agricultural products and most of the remainder consist of manufactured goods that are not classified as high technology. Thus, if the Administration tightens only those controls on high technology products, the change will affect few U.S. exports to the Soviet Union and Eastern Europe.

Such a change in U.S. export controls policy would apparently not be as far-reaching as previous Administration statements had suggested. A previous communication from the Reagan Administration to the Congress, for example, noted that the Soviet invasion of Afghanistan "brought to light the need for drastic redirection of our export controls toward the U.S.S.R." (*East-West Commercial Policy,* 1982, p. 25.) The Administration's rationale for a "drastic" change in export control policy had been its assessment of the costs and benefits of exporting to the Soviet Union. Western technology, the Administration had said, had provided the Soviet Union and other Warsaw Pact countries some technology and equipment needed to modernize their military-industrial base, placing the Soviet Union in a strategically comparable position to the United States. At various times, Administration spokesmen have suggested that the economic costs of transferring technology to the Soviet Union are reflected in rising U.S. defense expenditures. (See, for example, the statements of Lawrence J. Brady, former Assistant Secretary of Commerce for Trade Administration, and Fred C. Ikle, Under Secretary of Defense for Policy in Senate, Committee on Banking, Housing and Urban Affairs, 1982.)

Similarly, in assessing the costs and benefits of Western trade with the Soviet Union, a report by the Central Intelligence Agency maintained that the costs of transferring Western technology to the Soviet Union far outweighed the benefits. According to the report:

> . . . While difficult to quantify, it is clear that the Western military expenditures needed to overcome or defend against the military capabilities derived by the acquisition of Western technology far outweigh the West's earnings from the legal sales to the Soviets of its equipment and technology. (U.S. Central Intelligence Agency, *Soviet Acquisition of Western Technology,* 1982, p. 10.)

The Administration's response to the Joint Economic Committee presents a somewhat different assessment of the costs and benefits of trading with the Soviet Union. It maintains that most exports to the Soviet Union do not contribute to Soviet military strength because they include only a small volume of high-technology items and because items of strategic value are rigorously excluded from shipment under U.S. export controls. Moreover, the response maintains that exports to the Soviet Union and Eastern Europe have been a source of significant commercial gain to the United States. The Soviet Union and Eastern Europe have purchased 16–23 percent of U.S. grain exports and, before the imposition of economic sanctions in the aftermath of the Soviet invasion of Afghanistan and the declaration of martial law in Poland, a significant quantity of U.S. machinery and equipment.

In commenting on the CIA study, the response emphasizes that illegal acquisitions of Western technology play at least as great a role in improving Warsaw Pact military capabilities as do legal purchases. Such illegal purchases the response says, should not be included in any assessment of the cost and benefits of legal technology sales. Some critics of the Administration's policy have expressed concern that Administration spokesmen do not always distinguish clearly between Soviet legal and illegal acquisition of Western technology. They are concerned that the existence of illegal technology transfers and Administration efforts to combat them have become confused with legal trade and the issues of export licensing. Some exporters, for example, support the Administration's efforts to strengthen enforcement of existing laws and regulations, but see no need for instituting more restrictive criteria for export licensing. (See for example, the statement of Vico Henriques, President of Computer and Business Equipment Manufacturers Association in U.S. Congress, Senate Banking Reauthorization, 1983, p. 230.)

The response also notes that the volume of technology sales from other Western sources far exceeds the volume of sales by the United States. Sales from other countries, it says, might be more important to Soviet military enhancement than U.S. sales. In conclusion, the response notes that trade helps realize the comparative advantages of both parties engaging in it. If trade improves Eastern military capabilities indirectly, it maintains, it also improves U.S. military capabilities by raising U.S. economic well-being above what it would be without trade.

3. THE EASTERN ECONOMIES*

1. Background

During the early 70s, the smaller countries of Eastern Europe, (i.e., the CMEA-Six) [1] adopted in varying degrees—with Poland in the lead—an economic growth strategy aimed at modernization and consumerism through import substitution. The availability of Western credit and the sale of Soviet oil and gas at below world market prices allowed the Eastern countries to turn to the West for significant amounts of technology, which it was felt would enable the East Europeans to modernize and improve their industrial and agricultural capabilities quickly and efficiently. The expansion in the availability of loanable Western funds during the 1970s was due in the main to petro-dollar recycling. From a rather low level, Eastern indebtedness to the West reached substantial proportions. Western trade with Poland, Romania, and Yugoslavia increased most significantly, while trade with Hungary, the GDR, Czechoslovakia, Bulgaria and the U.S.S.R., respectively, grew more modestly. Western loans to the CMEA-Six were accompanied by Soviet energy sales at below market prices. By charging such low prices the Soviets were, in effect, subsidizing the oil and gas purchases of the CMEA-Six.

Western technology transfers to the CMEA-Six took the form of imports, industrial cooperation and—in some cases—direct investment. Their results measured in improved output were uneven. The best results were in intra-German transfer (FRG to the GDR) in the area of industrial processes; Hungarian and Bulgarian agriculture were also successful recipients of Western technology. By contrast, imported technology led to little improvement in Polish industrial and agricultural output.

By the latter part of the decade, some of the problems in carrying out an economic growth strategy based on import substitution became clear. Many East European countries ended up borrowing much more from the West than they had anticipated. Their exports, both old and new, did not keep pace with their imports, and additional loans were needed to service their debts. Moreover, many used importation as a substitute for improvement in domestic performance (e.g., Poland) and, in some cases, Western imports were required to finish projects that had been started with Western technology. The absorption of Western technology into the Eastern centrally planned economies also proved to be more difficult than expected.

Meanwhile, the prices of Soviet fuel exports to the CMEA-Six had been forced up by the 1973 energy crisis. Although the prices paid by these countries were still much lower than what the Soviets were charging their other buyers, they were nonetheless a drain on East European hard currency resources needed to buy Western technology.

While the West has been the primary supplier of technology for Eastern Europe since the Seventies, the Soviets have been importing technology from both the West and Eastern Europe. For the past decade and a half, Eastern Europe has been a major source of technology for the Soviets, particularly through the importation of machinery. The Soviet Union may import even more machinery from the CMEA-Six in the Eighties, despite its ability to obtain Western credit and earn hard currency for importing Western technology. Increased integration, including greater Soviet reliance on CMEA capital goods, may heighten Moscow's interest in CMEA-Six technology.

Increased reliance of the U.S.S.R. on the CMEA-Six for machinery imports raises the question of the role of the CMEA-Six as a channel, or conduit, for Western technology. Certainly, the close technological and economic ties between the FRG and the GDR have facilitated the relatively superior modernization of GDR industry and enhance the value of GDR machinery trade to the U.S.S.R. This poses a dilemma in Soviet policy: Will the U.S.S.R. encourage increased integration within CMEA and more intra-CMEA exchange of industrial products and technology, or will the U.S.S.R. encourage the CMEA-Six to increase their imports of Western technology in order to facilitate the modernization of East European machinery that has been of value to Soviet trade?

Judging from the fifteen year gap between CMEA summits (1969–1984), the prospects of formulating a viable integration policy in the short term do not appear fa-

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[1] CMEA is the Council for Mutual Economic Assistance. Its members include: the U.S.S.R., Bulgaria, Czechoslovakia, German Democratic Republic (GDR), Poland, Hungary, Romania, Mongolia, Cuba and Vietnam. It is also known as Comecon. The CMEA-Six consists of Bulgaria, Czechoslovakia, GDR, Hungary, Poland, and Romania.

vorable. Differing views held by the Soviets and the East Europeans as to what terms such an integration policy should be based upon (i.e., Soviet energy in return for East European machinery), the global economic situation, tensions in East-West relations, and the changes in the Soviet leadership all militate against increased CMEA integration. Even if a workable strategy of "socialist economic integration" could be agreed upon, the problems of coordinating the domestic institutions of seven different countries would still have to be dealt with.

If instead the Soviet Union encourages the CMEA-Six to once again increase their imports of Western technology (especially to improve their machinery exports) this would force the East Europeans to deal once again with old problems; first of all, credit. The Soviet attitude toward CMEA technology ties with the West affects how the Soviets view CMEA-Six creditworthiness. The U.S.S.R. has never accepted the role as the debtor of last resort—the Soviet credit umbrella over the CMEA-Six. Although in the long-term it seems likely that Western loans to the CMEA countries will be more forthcoming, they will not be on the scale of the 1970s and will take place with more discrimination on both sides: Eastern Europe more careful on import substitution and Western banks more discriminating in loan policy.

A second problem is the assimilation. It is uncertain whether allowing longer periods of time for the transfer and assimilation of foreign technology, as well as for the completion of new projects would improve domestic performance. Although effectiveness of absorption and utilization of Western technology varies from sector to sector, it does not compare with Western counterparts.

Moscow, Eastern Europe, and the Western capitals have some interests in common regarding economic performance in Eastern Europe. These interests include: increased economic growth, modernization, and enhanced consumer welfare in the CMEA-Six. But, in many instances, their interests are incompatible and competitive. The Soviet Union is able to, and undoubtedly would, set certain limits on change in Eastern Europe. Yet, the limits set by the Soviet Union and upheld by local communist parties allow the region some flexibility, as Hungary's New Economic Mechanism and the GDR's technocratic professionalism attest. In addition, the Soviets have come a long way toward a favorable judgement on the question of CMEA country membership in international monetary organizations such as the IMF, World Bank, and GATT. They approved both Hungarian and Polish applications in 1981. (Poland has not yet been accepted due, in part, to the U.S. reaction to martial law). On the plus side, CMEA country membership in these organizations provides better access to Western resources (loans for stabilization from the IMF or development loans for those who qualify from the World Bank), more stability in the CMEA-Six plans, and some international recognition. On the minus side, these organizations require information, facilitate Western "penetration" of the CMEA planning and financial institutions, and suggest Western leverage or influence.

2. Commentary

A continuing surplus of CMEA exports to the West ($3–$4 billion in 1983) could provide the basis for increased East-West commercial relations. (See Additional Sources.) However, the expanding Eastern trade may be primarily with Western countries other than the United States if the U.S. remains non-competitive. All other OECD countries have provided their exporters with advantages in terms of trade facilitation, export financing, market access, tariff privileges (MFN) and certainly of commercial relations that are superior to those provided by the United States. Furthermore, the special historical-political relationships between the Federal Republic of Germany, and the German Democratic Republic, Austria and Hungary add to the West European competitive edge over the U.S. in trade with the East, as do the traditional intra-European trading relationships. In recent years, the West Europeans have been stepping up their export drives in Eastern Europe. The same is true of the Canadians, who in September 1983 concluded a Trade Agreement and a Three-Year Grain Agreement with the GDR.

U.S. trade with Eastern countries with which it has Trade Agreements (i.e., Hungary and Romania), extends official credit—Export-Import (ExIm) Bank credits and Commodity Credit Corporation (CCC) credits, and grants MFN is generally equivalent to that of other OECD countries. But market disruption and other import restrictions limit trade prospects not only with those countries but with the GDR, Czechoslovakia, and Bulgaria as well.

Since the late 1970s, the scope of non-agricultural technologies that are considered too sensitive for export to the Eastern bloc has grown. The 1976 Bucy Report called for the controlling of specific techologies based on their criticality in terms of timeliness and state-of-the-art. The Export Administration Act (EAA) of 1979 related

these factors to the military significance of technology exports and, as mandated by the EAA, a Militarily Critical Technologies List (MCTL) was compiled by the Defense Department. As efforts have been made to perfect the original MCTL, the issue of dual usage (i.e., technology used for both civilian and military purposes) has come under intense debate. With civilian developments now becoming the cutting edge of technological advance and technology advancing at such a rapid pace, as recognized by long-time U.S. defense officials, it has become more and more difficult to distinguish dual-use technology from single-use technology:

> . . . There are almost no militarily significant technologies which do not also have important peaceful uses. Indeed, in the highly industrialized modern world, while arms and ammunition can still be identified, the distinction between implements of war and peaceful goods as well as the technologies for their manufacture has become so blurred that whether an item is a sword or a plowshare depends today not so much on how it is made but on how and by whom it is used . . . So common is this dual-use characteristic that it is almost impossible to draw up a list of items, whether goods or technology, whose embargo will inhibit weapons development without including some items whose embargo will also inhibit (the) peaceful trade activities. . . . (Maurice Mountain in *Issues in East-West Commercial Relations*, 1979, p. 30.)

The degree to which the centrally planned economies of the Soviet Union and Eastern Europe can successfully assimilate Western technology has also been under debate. Although there is no doubt that Western technology has improved the economic performance of the Eastern bloc, there is some question as to just how helpful it has actually been and over what period of time.

An issue related to the question of assimilation has to do with whether the countries of Eastern Europe can be considered direct conduits of technology between the West and the U.S.S.R. Opinions seem to vary:

> Few Western specialists on CMEA view any member as full, direct technology conduits to the U.S.S.R. from the West. Most accept that the substantial degree of integration of CMEA and the strong military and economic leverage of the Soviet Union assures them of a cooperative policy on sharing the benefits of Western trade. Within this range of perceptions, the degree of coordination of East European import policies are variations by country. (John P. Hardt and Donna L. Gold, *Premises*, 1983, p. 7.)

Even if one were to take the extreme position that the CMEA countries do in fact act as direct channels for the passage of technology between the West and the U.S.S.R., the question of how tightly the U.S. should attempt to control technology in Eastern trade must still be addressed:

> It is unrealistic to expect that a system of export restrictions can prevent a nation like the U.S.S.R. from acquiring over time any particular level of technology the West has developed. Indeed, it can be assumed that inadvertent leakage, clandestine acquisition and indigenous development will combine to assure that this takes place eventually. This process cannot be halted, it can only be retarded. Thus, the true measure of effectiveness of controls over technology is how long the catch-up process takes. (Mountain, Maurice, *op. cit.*, p. 31.)

The Reagan Administration has reaffirmed its commitment to a policy of differentiation in its commercial relations with the Eastern bloc, like that enunciated by previous administrations, and has referenced it in both its proposed revisions to the 1979 Export Administration Act and the 1983 Export-Import Bank Act Amendments. As indicated in those acts, an independent country or a differentiated country policy on bilateral commercial relations should reward conformance to accepted international norms.

Vice President Bush's speech in Vienna on September 21, 1983 explaining differentiation in U.S. policy towards Eastern Europe caused considerable concern among the East Europeans, and its interpretation may be at variance with U.S. policy articulated in U.S. trade legislation and international agreements. Accolades in the Bush speech to Hungary and Romania pose two problems: (1) "They do not toe the Soviet lines," (2) "They have either open societies or nonbelligerent foreign policies." Using disagreement with Soviet policy as a criterion for acceptance puts the East European countries in a very difficult, if not impossible, situation. They must explicitly reject this policy line as anti-Soviet. To credit Romania implicitly with overall compliance with mutually accepted or U.S. policy is to give heavy weight to presumed Romanian foreign policy independence. By domestic criteria, Romania does not rank high: Romania is possibly the must closed, repressive, authoritarian society in Eastern Europe.

The domestic policies of each East European country are different. They all have some "room for maneuvering," especially in internal economic policy. The need and appropriateness of different economic mechanisms in the Central European countries due to historical, ethnic and other differences have been recognized by past Soviet leaderships. ("Soviet Loosen Their Grip on Eastern Europe", Special Report, *U.S. News and World Report*, December 5, 1983, pp. 35–38). Economic policy and performance offer individual Eastern European countries the greatest opportunity for independence from the U.S.S.R.

Commercial relations are the most effective means by which Western governments can influence Eastern country policy and performance. Most East European leaders are committed to economic policies of modernization (making their economies more competitive with Western economies in quality of output) and, to varying degrees, consumerism. Without Western economic ties, the East European countries are more closely dependent on the U.S.S.R., less able to emphasize modernization and consumerism, and thus more likely to be repressive. Trade has traditionally been considered by many in Western Europe, especially by the West Germans, as among the most effective levers for encouraging beneficial political and economic change in Central Europe.

U.S. policy, consistent with the Helsinki Final Act and the most recent CSCE update at Madrid in September 1983, is the official policy guide for dealing with East European countries. As both the East and West are parties to these agreements, the United States views the commercial principles in Basket II and human rights principles in Basket III as international guidelines based on mutual obligations and commitments. The U.S. Government may be able to influence these countries toward closer conformity with those norms, but only if the Government makes clear to them what principal criteria it is basing its judgments on and what limits it is placing on policy. The U.S. favors policies that enhance the living conditions of citizens of other countries, especially in contrast to expanded military programs, and governments that are more responsive to the human, political, and social rights (including religious freedom) of their populace.

Additional Sources:

(1) Patrick Blum, "Comecon Exports 'Will Rise 7%'," *Financial Times*, July 20, 1984.

(2) Brussels Staff, "Soviet Union 'Key to Exports to East Europe:' " *Financial Times*, January 10, 1984.

(3) David Buchan, "Comecon Countries Cautious Over Reopening Doors to Imports," *Financial Times*, December 5, 1983.

(4) United Nations Economic Commission for Europe, Geneva, Switzerland, Economic Survey of Europe in 1983, November 1984.

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CHART II.3.1

GNP GROWTH RATES IN EASTERN EUROPE AND THE U.S.S.R. 1961–82

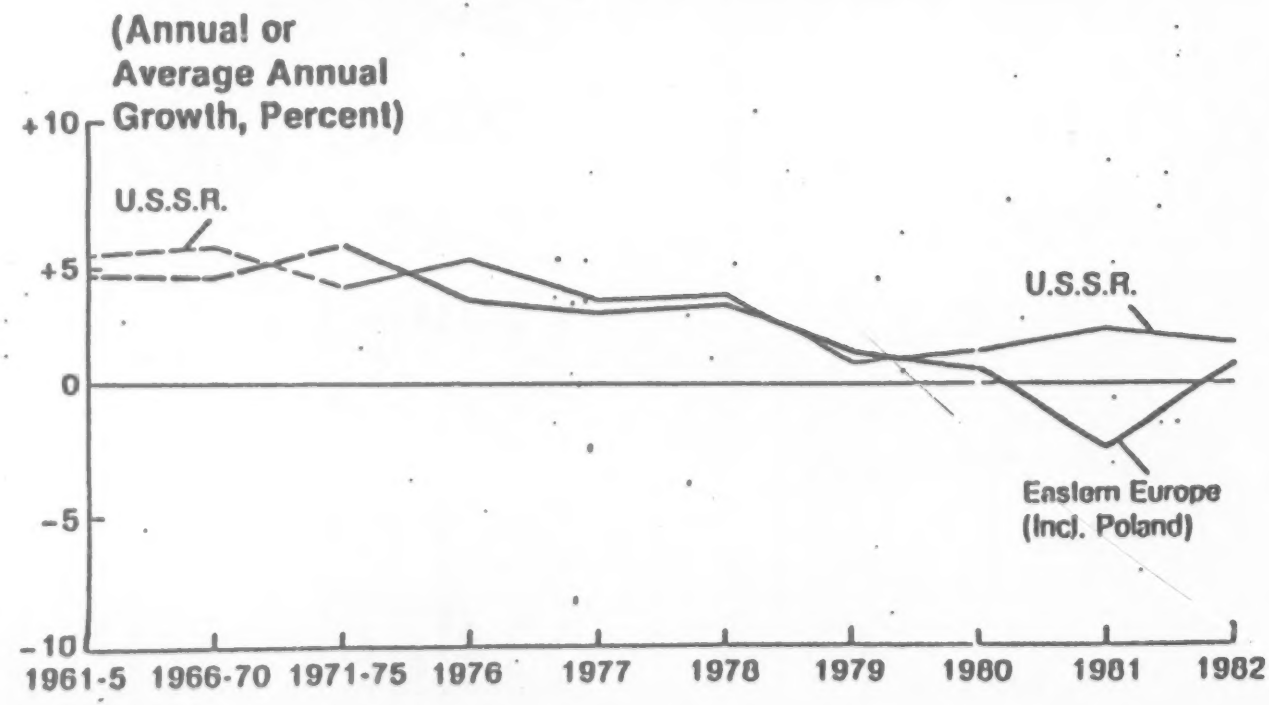

TABLE II.3.1.—HARD-CURRENCY DEBT OF THE USSR AND EASTERN EUROPE

[Year-end 1982, in millions of dollars]

Country	Gross debt	Net debt [1]	Owed to U.S. Government	Owed to U.S. Banks [2]	Estimated debt service ratio [3]
U.S.S.R.	20,100	10,100	403	223	16
Poland	24,800	23,800	1,700	1,126	[4]100+
East Germany	13,400	11,435	0	866	56
Romania	9,770	9,460	261	212	45
Hungary	7,800	7,050	25	911	35
Czechoslovakia	3,970	3,200	0	155	19
Bulgaria	2,850	1,850	0	191	31
Eastern Europe	62,590	56,795	1,986	3,461	

[1] Gross debt less assets with Western Banks.
[2] Charter basis (includes U.S. banks abroad), less guarantees.
[3] Debt service (principal and interest due in given year) divided by hard-currency commodity export earnings, plus receipts from sales of arms and gold, and from interest, net invisibles, and transfers.
[4] Calculation depends on final rescheduling.

Source: Handbook of Economic Statistics, 1983; Country Exposure Lending Survey.

TABLE II.3.2.—I. U.S. EXPORTS TO THE U.S.S.R. AND EASTERN EUROPE—U.S. DOMESTIC EXPORTS

[In thousands of dollars; f.a.s. value basis]

Commodity/country	1979	1980	1981	1982	1983	1984 (through September)
Total	5,660,007	3,842,679	4,236,847	3,385,362	2,878,645	2,809,031
U.S.S.R.	3,603,821	1,509,747	2,338,818	2,388,975	2,001,951	2,154,084
Bulgaria	56,225	160,701	258,104	106,453	65,389	39,091
Czechoslovakia	281,129	185,145	82,420	83,598	57,079	45,371
German Democratic Republic	354,522	477,389	295,557	222,657	138,915	96,121
Hungary	77,588	79,020	77,511	67,842	109,781	49,797
Poland	786,258	710,146	680,547	292,606	319,872	240,785
Romania	500,464	720,231	503,890	223,231	185,658	183,782

Source: Compiled from official statistics of the U.S. Department of Commerce.

TABLE II.3.3.—II. U.S. IMPORTS FROM THE U.S.S.R. AND EASTERN EUROPE—U.S. IMPORTS FOR CONSUMPTION

[In thousands of dollars; customs value basis]

Commodity/country	1979	1980	1981	1982	1983	1984 (through September)
Total	1,855,829	1,387,901	1,542,289	1,052,484	1,351,571	1,548,886
U.S.S.R.	872,849	431,246	357,424	228,792	341,093	376,921
Bulgaria	30,145	22,845	25,604	25,124	32,765	23,179
Czechoslovakia	49,899	61,102	67,232	61,548	62,821	62,644
German Democratic Republic	35,666	42,959	44,702	51,773	56,937	91,265
Hungary	112,129	104,269	127,939	133,238	154,493	168,468
Poland	426,090	414,919	359,939	212,888	190,641	156,088
Romania	329,051	310,561	559,449	339,121	512,621	670,321

Source: Compiled from official statistics of the U.S. Department of Commerce.

4. AGRICULTURE*

1. Background

The Soviet Union's strategy of expanding meat availability for use as an incentive to increase labor productivity, coupled with periodic grain shortages, led it to make a policy decision to begin importing large quantities of U.S. grain in the early 1970's. Soviet demand for U.S. grain was highly variable; large purchases occurred in 1972 and 1975 but little or none was bought in the other years up to 1975.

Because the Soviets have the capacity to disrupt world grain markets through sudden large cash purchases, as evidenced in 1972, the U.S. Government in 1975 pursued the negotiation of a long-term supply agreement with the Soviets that would stabilize and regularize Soviet purchases and secure as much information as possible about Soviet purchasing intentions. The first Long-Term Grain Agreement (LTA) was signed in October 1975 for five years beginning on October 1, 1976. The agreement committed the U.S.S.R. to purchase, and the U.S. to supply, 6 million metric tons (MMT) of wheat and corn in approximately equal amounts on an annual basis. All purchases were to be at market prices, and were to be handled by the U.S. commercial firms. Unless U.S. grain supplies fell below 225 MMT in any given year, the Soviets had the option of purchasing an additional 2 MMT of grain without consulting the U.S. Government. Annual purchases above the 8 MMT amount required prior approval by the U.S. Government. The agreement specified that there would be semi-annual consultations between the two countries to create regular, identifiable communication channels regarding potential U.S. sales and Soviet import requirements.

Under the terms of the agreement, the Soviets purchased 6.1 MMT of wheat and corn during the first agreement year (October 1976–September 1977), 14.6 MMT during the second year, and 15.5 MMT during the third. In the fourth year, the Carter Administration authorized Soviet purchases of 25 MMT, but subsequently reduced that amount to 8 MMT—the maximum assured under the terms of the grain agreement—in response to the Soviet invasion of Afghanistan. This embargo effectively invalidated the sale of up to 17 MMT of U.S. grain to the Soviet Union. The Carter Administration decided to honor the agreement for what was to be its fifth and final year and again authorized sales of 8 MMT. The U.S.S.R. eventually purchased 9.5 MMT during the fifth year of the agreement.

The Reagan Administration lifted the embargo on agricultural commodities on April 24, 1981. During the first week of August 1981, U.S. Trade Representative William Brock announced that the grain agreement, which was due to expire on September 30, would be extended for an additional year. On October 1, the Administration announced that the Soviets could purchase up to 23 MMT of grain during the sixth year of the agreement. The Soviets eventually purchased approximately 13.9 MMT of U.S. grain during the sixth year.

Prior to the embargo, the U.S. share of the Soviet grain import market averaged about 74 percent. That fell to 23.5 percent during the embargo, increased to roughly 34 percent in 1981/82 and fell again to 19 percent in 1982/83. Other grain exporting nations, particularly Argentina, have filled the void created by the U.S. Argentina has increased its production of grain to meet growing Soviet import needs. Prior to the 1980 embargo, about 10 percent of Argentina's grain exports went to the Soviet Union. Following the U.S. embargo, this percentage jumped to 60%, and in 1981 to 77%. Since the embargo was lifted and the U.S. increased its market share somewhat, Argentina's share of the Soviet market fell to 58% in 1982 and 45% in 1983—still significantly above pre-1980 levels.

Negotiations on a new long-term grain agreement were expected to occur during 1982. Discussions were suspended, however, as part of a series of economic sanctions against the Soviet Union in response to the imposition of martial law in Poland in late 1981. The Administration was under considerable pressure not to renegotiate or extend the agreement with the Soviets in 1982 because of the Polish situation. However, President Reagan, citing a perceived relaxation in martial law, announced in July 1982 that the U.S. would seek a one-year extension of the agreement. When the extension was agreed to in October, he announced that the United States would make 23MMT of grain available to the Soviets during the seventh year of the agreement. The Soviets eventually purchased only 6.2 MMT of U.S. grain during the seventh year of the agreement.

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*Prepared by Penelope C. Cate, Specialist in Agricultural Policy, Environment and Natural Resources Policy Division.

The decisions to both impose and lift the 1980/81 embargo, to approve large above-agreement sales, to extend the 1975 LTA, and to defer negotiations on a new long-term agreement have been controversial within the Administration, the Congress, the farm community and the general public. Initially, the decision to impose the embargo had widespread support. Opposition grew and intensified as the embargo's effectiveness was increasingly called into question. The issue of terminating the embargo was debated for several months within the Administration, with the U.S. Department of Agriculture (USDA) and the State Department clearly split on the decision to end the embargo. The particular impact and effectiveness of the embargo remains in dispute as does the wisdom of lifting the embargo and the timing of that decision. Some representatives of the Reagan Administration, particularly those in the USDA, and the farm community condemned the embargo and applauded its termination as well as all efforts to expand U.S. grain exports to the Soviet Union, seeing those actions as an attempt to return the U.S.-Soviet grain trade to its usual basis. Others objected that the U.S. should not continue to bail out the Soviet Union which has suffered several years of poor harvests.

Even after 10 years of agricultural trade, the issue of U.S. grain sales to the Soviet Union remains controversial and embroiled in foreign policy considerations. Rather than address the more serious and difficult task of renegotiating a new agreement or allowing the 1975 agreement to lapse, the Reagan Administration choose in both 1981 and 1982 to simply extend the original five-year agreement. The issue of whether to continue trading under a bilateral agreement was finally settled in 1983 with the signing of a new LTA.

As was the case with almost every other major agricultural trade transaction between the U.S. and the U.S.S.R., the negotiation of the new five-year agreement was controversial. Some policymakers felt the U.S. would be bargaining from a position of strength given the Soviets' continued need to purchase large amounts of grain on the international market. Given this perceived position, many both within the agricultural community, as well as outside the community, argued for "better" concessions for the U.S. in any new agreement. Specific proposals included: negotiation of significantly higher purchase levels for grains; inclusion of new commodities in the agreement, especially the higher-valued agricultural products; and purchases of farm equipment.

Others argued that the U.S. would be at a disadvantage at the bargaining table given this country's need to reduce our massive domestic grain surpluses through exports as well as the Soviets' demonstrated ability to go elsewhere for their grain. Still others argued, and continue to argue, that trade between the two countries would be unaffected if the 1975 LTA were to lapse. Still others argue that the U.S. should not be selling grain to the Soviet Union at all since these sales benefit a non-friendly nation.

The Reagan Administration has responded to the latter charge arguing that not only are the Soviet grain sales important to U.S. farmers' incomes, they also are strategically important to the U.S. According to the Administration, these sales force the Soviets to expend scarce exchange on grain rather than on imports of high technology or other militarily strategic items.

Negotiations on the second LTA began in early 1983 and were concluded in August with the signing of the new long-term agreement. The second agreement is essentially similar to the first with a few modifications. Minimum and maximum purchase levels were raised, but not nearly as high as some had hoped. The agreement commits the Soviets to purchase, and the U.S. to supply, between 9 and 12 MMT of wheat and corn or soybeans on an annual basis. This inclusion of soybeans represents a change from the previous agreement. The 1983 LTA specifically provides for annual purchases of 4 MMT of wheat and 4 MMT of corn. The additional one MMT can be allocated in four separate ways. It can be either an additional one MMT of corn, or of wheat, or a combination, or .5 MMT of soybeans or soybean meal. In addition, the new LTA does not include any "escape clause" whereby the U.S. can void its commitment to sell grain because of production shortfalls.

Administration officials hoped that this agreement would help restore the reputation of the United States as a reliable supplier and would begin to rebuild normal U.S.-U.S.S.R. trade relations. Following the Carter embargo, the U.S.S.R. concluded bilateral agreements for agricultural commodities with Canada (5 MMT), Argentina (4.5 MMT), Brazil (1.44 MMT), Hungary (.80 MMT), and India (.64 MMT). All but the Indian agreement were for five years. Together these required annual purchases will supply much of Soviet grain import requirement. As a result of these agreements with U.S. competitors and other purchases, the United States' share of the Soviet market was estimated to fall to an estimated 19 percent in 1983.

It would apparently take a great deal of effort if the United States chose to pursue restoration of its position in the Soviet grain trade to pre-embargo levels; but the agreement, from an Administration perspective, demonstrates a commitment to increase exports of American farm products to this market. The Administration's position against selective agricultural embargoes was put to the test in September 1983 when the Soviets shot down Korean Airlines Flight 007 near Japan. Despite calls for abrogating the new LTA and embargoing all grain shipments to the Soviet Union, the Administration did not include agricultural trade sanctions in the response.

Congress seems equally concerned about re-establishing this country's reputation as a reliable supplier and regaining a predominant share of the Soviet market. Since 1980, Congress has passed two pieces of legislation affecting the U.S.-Soviet grain trade. Provisions of the Agriculture and Food Act of 1981 (P.L. 97-98) make the imposition of a selective agricultural embargo an expensive and cumbersome proposition for an administration by requiring significant levels of compensation to farmers if a limited embargo is imposed. Provisions in the Commodity Futures Trading Act of 1982 (P.L. 97-444) allow for the sanctity of agricultural export contracts for up to 270 days following the imposition of an embargo. The only exception would be for national emergency or war. In addition, during the period where no negotiations were occurring because of tensions between the U.S. and U.S.S.R., a number of Members of Congress endorsed sense of Congress resolutions urging the President to initiate discussions with the Soviet Union over a new LTA.

The agricultural community, many Members of Congress, particularly those with large farm constituencies, and many in the Administration remain concerned over current and future U.S. agricultural sales levels to the U.S.S.R. In an effort to restore this country's reputation as a reliable supplier, certain policies and programs have been adopted that provide somewhat special consideration to agricultural exports. Critics of these special provisions express concern that American policies on agricultural and non-agricultural exports are inconsistent. They note that this was certainly our allies' perception of U.S. policy when this country imposed economic sanctions related to the gas pipeline to Europe, yet continued to freely trade agricultural products. Some observers also are concerned that little effort is made to promote commodities other than grain, and they advocate promotion of expanded agricultural technology transfers not only to the Soviet Union but to other non-market economies, such as Poland, Hungary and the PRC, as well. One way to increase non-grain exports, they maintain, would have been to include agricultural technology in the new LTA. Some of those involved in the LTA negotiations argue that the Soviets do not seem very interested in such trade and that this country's position at the bargaining table was not, and is not, strong enough to exact such a concession from the Soviets. Still others question the wisdom of promoting large-scale agricultural technology transfers to communist countries which can use this technology in a variety of nonagricultural ways.

2. Commentary

Despite the 1983 signing of a new U.S.-U.S.S.R. long-term agreement culminating 10 years of agricultural trade between the two countries, the issue of U.S. grain sales to the Soviet Union remains controversial in some cases and tied to foreign policy considerations, as is all U.S.-Soviet trade. Although the Reagan Administration has presented a unified public position, the specific views of USDA, State Department, and U.S. Trade Representative officials have differed, particularly over the use of trade sanctions.

President Reagan repeatedly has stated his commitment to continue agricultural exports to the Soviet Union. But some Administration policy statements have reflected the inherent difficulty of balancing this nation's foreign policy considerations with its economic objectives. On the one hand, the Reagan Administration has taken the following steps to reassure American farmers of their access to the Soviet market:

Lifting the 1980 embargo of grain sales to the Soviet Union;

Twice extending the 1975 LTA;

Negotiating a new LTA;

Announcing in March 1982 and again in August 1982 before the National Corn Growers Association's annual convention the Administration's "agricultural trade doctrine" which states that: "There will be no restrictions on farm products proposed because of rising farm prices. Farm exports will not be singled out as an instrument of foreign policy and can be used only as part of a

trade embargo if it is broad and supported by other nations across the board in a situation that would be so serious as to cause this action";

Signing into law legislation guaranteeing contract sanctity for 270 days following the imposition of an agricultural embargo, except in cases of national emergency or war;

Refusing to impose agricultural trade sanctions against the Soviet Union in response to the imposition of martial law in Poland; and

Resisting intense pressure to include agricultural export restrictions in its package of sanctions against the Soviet Union for that country's downing of the Korean airline near Japan on September 1, 1983.

On the other hand, the Reagan Administration has indicated that U.S. export sales to the Soviet Union remain contingent upon that nation's behavior in the international arena, a policy that has been consistently applied to the Soviet Union by the U.S. since World War II. Mr. Reagan has repeatedly made assurances that agricultural exports will not exclusively bear the brunt of foreign policy actions, and will only be interrupted as a part of an across-the-board embargo on all exports to the Soviet Union. However, given the predominance of agricultural products in U.S.-Soviet trade, if a general embargo were imposed, agricultural interests would bear the lion's share of losses.

Although the Administration's position on contract sanctity—guaranteeing that existing valid export sales agreements will be honored despite the imposition of export restrictions—has been qualified on a number of occasions, a provision for agricultural contract sanctity was included in the Commodity Futures Trading Act of 1982, signed by President Reagan. The Administration's initial reluctance to accept the contract sanctity provision may have reflected the traditional Executive concern for balancing trade and diplomatic interests. In August 1982 President Reagan told the Corn Growers that grain sales under the LTA would be treated with the sanctity of contract. Further Administration statements made clear that Mr. Reagan intended to treat as sanctified only the 6–8 million metric tons guaranteed for delivery by the 1975 LTA. The same is true of the 1983 LTA with 9–12 MMT being treated as sanctified. Moreover, the Administration has continued to oppose inclusion of a blanket contract sanctity provision—covering all exports—in the proposed reauthorization of the 1979 Export Administration Act. Of course, in any Administration the Executive branch has a natural interest in preserving its power and discretion vis-a-vis the Legislative branch.

The Administration originally proposed a limited contract sanctity provision which allowed wide latitude for the President to cut through existing sales contracts in a variety of circumstances. Later, the Administration supported a House amendment which specifically allows contracts to be abrogated if an embargo is imposed in response to nuclear aggression, terrorism, or violation of human rights.

Other Administration actions and statements also seem to reflect the difficulties in establishing a stable and long-term trade relationship between the two superpowers. For example, resumption of grain trade with the U.S.S.R. did not follow immediately after the election; the delay in fulfilling President Reagan's campaign promise of lifting the Carter grain embargo seemed to reveal a division of opinion within the Administration, with the USDA committed to reopening trade and the State Department opposed. The State Department feared that lifting the embargo would send the wrong signal to the Soviets in a period of tense East-West relations. In the same vein, the President suspended scheduled renegotiation of a new LTA in 1982 as part of a package of economic sanctions against the Soviet Union over the imposition of martial law in Poland. Generally speaking, both public and private statements by USDA officials reflect that agency's interest in expanding U.S. agricultural exports and concern about the reliable supplier issue. Despite concerns about the United States's image as a reliable supplier and predictions that the Soviet Union will continue efforts to diversify its sources of supply, USDA remains fairly optimistic about the outlook for U.S. exports of grains to the Soviet Union. This optimism is based in part on the negotiation of the new LTA with higher minimum and maximum purchase levels as well as that agency's belief that the Soviets continue to be fairly interested in purchasing U.S. grain. This interest was clearly demonstrated in 1984 with heavy Soviet purchases of U.S. grain.

But some observers, both within the Administration and outside, initially questioned the potential impact of the new LTA on U.S. sales to the Soviet Union, arguing that in light of then current sales levels, the higher allowed levels were illusory as indicators of future trade. Still others did not share USDA's official view of continuing strong Soviet interest in purchasing grain from the United States. This position was reflected in the Administration's belief that 1982 was not a propitious time to negotiate a new LTA with the Soviet Union. To the contrary, the Administration

argued that the U.S. would have little leverage in grain negotiations given the fact that this country had plenty to sell in a market already overburdened with supplies and experiencing slack demand; the actual terms of the new agreement reflected this perceived "buyers' market" situation. Despite efforts on behalf of some domestic agricultural groups to have high-value commodities and farm equipment included in the agreement, as well as significantly higher minimum and maximum levels, many observers believe the second LTA represented little change from the 1975 LTA. The purchase levels were increased from a minimum of 6 MMT and a maximum of 8 MMT to 8 and 12, respectively, and some soybeans were included in the new LTA. The 1983 LTA also reflected the Administration's position that both the United States and the Soviet Union benefit from the grain trade and that each nation is mutually dependent on that trade.

According to Dale Tahtinen, Deputy Assistant Secretary, Office of East-West Trade, Department of State, the Reagan Administration believes that there is potential for growth in both U.S. agricultural and industrial trade with the Soviets, but that continued U.S.-Soviet trade depends on several factors: the trading relationship should not contribute to Soviet strategic capability; it must avoid preferential treatment; and be conducted on commercially sound terms. Factors that have and will continue to influence the relationship, Mr. Tahtinen states, include the Soviet's ability to pay in hard currency, the reliability of the U.S. as a supplier and Soviet behavior. Reiterating that the Reagan Administration is not interested in economic warfare, Mr. Tahtinen stresses that signs of constructive behavior on the part of the Soviets are key to improved overall trade relations.

The Administration continues to emphasize the consistency of its policy on grain and non-grain exports to the Soviet Union. Administration officials argue that grain exports are non-strategic and consistent with a policy of promoting non-strategic exports, but restricting those of a strategic nature. Moreover, the Administration argues that grain sales require the Soviets to expend scarce foreign exchange on food rather than on imports of strategic materials; some observers, especially in Western Europe, would challenge this argument. In their opinion, grain is a strategic export because large, continuing grain sales make it possible for the Soviet Union to accommodate persistent shortfalls in agricultural production and concentrate on increasing its military and industrial strength.

It is clear from the Administration's response that it is not inclined to promote agricultural technology-transfers to the Soviet Union, Poland, Hungary or the PRC, stating that there are no restrictions on these countries' access to Western agricultural technology. This position reflects the Administration's preference, whenever possible, to keep trade on a regular commercial basis.

5. MILITARILY CRITICAL TECHNOLOGIES*

1. Background

Controlling the export of militarily critical technologies has become increasingly difficult in recent years. Part of the problem is that the mass and complexity of new technology has increased dramatically, with more of it being developed for commercial use before there is any thought of finding a military application.[1] It is increasingly difficult to anticipate future applications of these new technology developments. To be effective, the licensing process must be able to identify technologies that have such a dual-use capability and then associate the technology with a specific product before it can be exported or otherwise released for wider use.

The Department of Commerce is charged with overall responsibility for administering our export licensing system, but it must coordinate with other Departments when jurisdictions overlap. If Commerce receives an export application for a product that incorporates a technology identified as one that could significantly advance or

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[1] Since World War II when Federal participation in the nation's overall research effort rose to very high levels, the Government's share of the nation's R&D effort has decreased steadily in relation to civilian research. Federal funding accounts for about 47% of the total national R&D investment. Under the Reagan Administration, there has been a slight increase in research directed specifically toward defense and about 71% of the Federal investment is defense-related, amounting to about 23% of total national research. The effect has been to reduce direct Government control of sensitive technology that is being developed in the United States. See: CRS Report no. Q 125 Gen. U.S. Civilian and Defense Research and Development Funding: Some trends and comparisons with Selected Industrialized Nations, August 29, 1983, p. 10. by William C. Boesman.

accelerate the military capabilities of a potential enemy, the Department of Defense must concur before the item can be exported. The Militarily Critical Technologies List (MCTL), developed by the Department of Defense under Section 5(d) of the Export Administration Act (EAA) plays a very important part in the process, helping to identify items of potential risk and to decide whether they can be exported safely. The MCTL includes: (A) arrays of design and manufacturing technology; (B) keystone manufacturing, inspection and test equipment, and (C) goods accompanied by sophisticated operation, application, or maintenance know-how. The MCTL does not identify specific items or end-products; these are listed on the commercial Commodity Control List (CCL) administered by the Department of Commerce or the International Traffic in Arms Regulation (ITAR) administered by the Department of State.

The MCTL has been criticized on several counts. Some say the list is too broad and that it lacks clarity and specificity for use at the operating level. Moreover, some argue that its use puts U.S. exporters at a disadvantage in overseas competition by delaying Commerce Department processing of about 75,000 end-product license applications just for non-Communist destinations annually. There is no clear consensus on how to improve the process, but most agree that the licensing workload can be made more manageable by making the list of critical technologies more specific, by making it more public, and by improving communication between the control agencies and between Government and industry.

American firms also complain that U.S. rules are more strict than those established by COCOM, an informal coordinating committee formed by the NATO countries, less Iceland and Spain but including Japan, to regulate technology transfer to the Eastern bloc countries on a multinational basis. An item is placed on the COCOM list only if all of the members agree and U.S. exporters say they often lose out to their European and Japanese competitors who deal with these countries on a much more regular basis than the United States. These firms argue the unilateral U.S. restrictions that are not observed by our allies are bound to be ineffective while imposing significant costs on U.S. producers.

Despite complaints that the existing licensing system is too burdensome, there is mounting evidence that critical military technologies are still slipping through the system in quantities that many consider alarming. A Central Intelligence Agency study said that the Soviet and East European intelligence services have been so successful in acquiring U.S. technology that there now exists a significant threat to the national security of the United States:

> They have succeeded in acquiring the most advanced Western technology by using, in part, their scientific and technological agreements with the West to facilitate access to new technologies . . ., by spending their scarce hard currency to illegally purchase controlled equipment, as well as to legally purchase uncontrolled advanced Western technologies having military-industrial applications; and by tasking their intelligence services to acquire illegally those U.S. and Western technologies that are classified and export controlled.[2]

2. Commentary

The Administration response identifies a fundamental difference between what the Export Administration Act intended and what the Militarily Critical Technologies List has become. Section 5(d) of the Act gave primary responsibility for developing the MCTL to the Secretary of Defense, but it also stipulated, as noted in the response, that Defense "should . . . bring together government and industry technical representatives to identify and define militarily critical technologies. . . ."

Critics of the MCTL process outlined in the Administration's answer believe it allows too much influence by the Defense Department which favors more extensive controls of technologies. They say that the list is too encompassing and that the description of the technologies is not specific enough to match them with specific items on license applications.

The Administration's answer also says that the list was published annually, but the MCTL has always been a classified document and distributed only to authorized recipients even though the Export Administration Act directed that it "should be published in an appropriate form in the Federal Register not later than October 1, 1980." However, the Defense Department believes that public release would enable enemies to use the MCTL as a "shopping list" and possibly even reveal technologies that our potential adversaries did not know existed. But critics of the current proce-

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[2] U.S. Central Intelligence Agency. *Soviet Acquisition of Western Technology*, April 1982. p. 2.

dure argue that making it public would allow wider input and remove much of the suspicion associated with the secret list.

The Administration's reponse appears to make a distinction between keystone equipment, etc. and "arrays of know-how", suggesting that the former should be included on the COCOM international control lists and the latter should be controlled unilaterally by the United States. Section 5(d)(2) of the Export Administration Act makes no such distinction, specifying that the Department of Defense give primary emphasis in developing the MCTL to: Arrays of design and manufacturing know-how; keystone manufacturing, inspection and test equipment; and goods accompanied by sophisticated operation, application, or maintenance know-how.

Indeed, section 5(c)(3) of the current Export Administration Act stipulates that if export controls are not multilateral with other countries, or if the item is available outside of multinational agreements, it will be removed from U.S. lists. Moreover, increased unilateral controls are likely to encounter substantial opposition from those in the United States who favor less control of technology exports.

In any case, adding a substantial number of items to the COCOM embargo list will be a very difficult undertaking. It would appear to go against the overall trend of the European members which has been toward liberalization of controls to encourage better relations and foster trade with Eastern countries. The practice has been for members to refuse to add items unless they were convinced beyond question that strategic concerns were at stake.

6. POLITICAL RELATIONS AND TECHNOLOGY TRANSFER*

1. Background

In recent years one of the key issues in East-West political and economic relations has been the question of agreement between the United States and its allies on a common policy. This was highlighted in 1982 by the discord within the alliance concerning West European participation in the Soviet export gas pipeline project.

At the "western economic summit" at Ottawa in July 1981, the joint communique noted that regarding the significance of East-West economic relations for our political and security interests, "there is a complex balance of political and economic interests and risks . . . We concluded that consultations and, where appropriate, coordination are necessary to ensure that . . . our economic policies continue to be compatible with our political and security objectives." The participants further pledged to "consult to improve the present system of controls on trade in strategic goods and related technology with the U.S.S.R." Critics of the Administration accused it of high-handed and unilateral action in its anti-pipeline sanctions against West European firms in 1982. At issue was a collision between the need to consult and coordinate trade policy with allies, and the need to protect national security interests. Although the Administration dropped its anti-pipeline sanctions in November 1982, the underlying issue is still alive. It was addressed by four major alliance studies of East-West trade and technology transfer, and follow-up studies, some of which are still continuing. (See CRS Issue Brief 83086, East-West Commercial Issues: The Western Alliance Studies.) It was also a subject of discussion at the western summit meeting in Williamsburg, Virginia in May 1983, and the COCOM meeting in Paris in July 1984.

In the 1970s, the United States Government undertook a number of steps to normalize U.S. commercial relations with the East, though not with the U.S.S.R. Among the most notable moves were the extension of most-favored-nation (MFN) status and U.S. Government credits to Romania, Hungary and China (Yugoslavia and Poland had already received them) and a substantial relaxation of U.S. export controls. In response to the Jaruzelski regime's imposition of martial law, however, Poland was deprived of MFN and government credits for political reasons, leaving Hungary and Romania as the only Soviet bloc states still enjoying that status. The Reagan Administration has sharply curtailed non-agricultural exports to the Soviet Union, which have sunk to the lowest level in more than 10 years. The Administration also favors more restrictive controls on technology transfer to other East European states. The Chinese government also complained of the Administration's reluctance to allow the export of certain sensitive technology, asking, in effect, "do you consider China a friend or an enemy?"

Since early 1982, there has been evidence of improvement in Sino-Soviet relations. The two sides have resumed talks at the deputy foreign minister level, after a more

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than two-year interruption caused by the Soviet invasion of Afghanistan. New trade and cultural exchange agreements were concluded in 1983 and 1984.

Many observers believe that the current Sino-Soviet interchange is not likely to go beyond some improvement in economic, technical, and cultural exchange, and the establishment of a more normal diplomatic dialogue, after the hostility of the past 20 years. Others, however, see the possibility of a more far-reaching accommodation or rapproachment. The re-establishment of a Sino-Soviet alliance against the United States, however, is not seen as a realistic prospect.

In January 1984, the visit of Chinese Premier Zhou Ziyang to Washington saw the conclusion of a U.S.-China trade agreement which liberalized the transfer of U.S. technology, including nuclear technology, to China. President Reagan's visit to China in April 1984 resulted in a still more far-reaching agreement to assist Chinese nuclear development.

2. Commentary

The general attitude projected by the Administration's spokesmen on issues of East-West (and West-West) political relations and technology transfer is one of optimism and confidence. A number of statements by different officials advances the view that 1983 saw a growing convergence between the policies of the United States and its allies regarding technology transfer to the East. Moreover, we are told, this convergence was substantially the result of Europeans moving closer to U.S. positions. The Administration points to the four alliance studies on general East-West trade relations, credit, energy, and strategic export controls as evidence of this convergence, as well as to the COCOM agreement of July 1984 on computer and communication technology transfer.

Some analysts outside the Administration believe that this convergence may be more apparent than real. In this view the Williamsburg economic summit and the four alliance studies represent an agreement *in principle,* which may be interpreted by both the United States and its allies as accepting their (still differing) points of view. This papering-over of differences might be followed either by the evolution of genuine concensus, or the resumption of open divergence. (East-West Commercial Issues: The Western Alliance Studies. IB 83086. p. 20).

Undersecretary of State Lawrence S. Eagleburger offered a less optimistic assessment of U.S.-West European cooperation at an informal foreign policy forum on Capital Hill, January 31, 1984. Asserting that Western Europe is "more and more concerned with its own problems" and "less and less in tune with the United States as we talk about our international security interests," the veteran State Department official (former Assistant Secretary of State for European Affairs) forecasts "a shift of the center of gravity of U.S. foreign policy from the transatlantic relationship toward the Pacific Basin and particularly Japan." (*Washington Post.* February 1, 1984. p. 16.)

Although the pipeline sanctions did not achieve the immediate objective of preventing the increase of West European dependence on Soviet energy supplies, the sanctions did achieve positive results, according to Administration officials. Repeated U.S. verbal representations in Western Europe against increasing dependence on Soviet energy supplies failed to impress the Europeans with the gravity of the situation. The strong and principled position of the Administration succeeded in getting this message across. While many in Western Europe criticized the pipeline sanctions at the time, those sanctions, painful as they were, contributed substantially to the increased allied unity that is evident today on issues of trade, credits, and technology transfer. Also, the U.S. stand on this issue has had the effect of reducing the likelihood of West European participation in a "second strand" of this pipeline—a prospect that had previously been viewed favorably by many in Western Europe.

Not all observers accept the Administration's contention that its 1982 gas pipeline sanctions had a positive overall effect. Some criticize the sanctions as a "two-by-four approach" to getting our allies' attention, which did more harm than good to relations between the United States and its European allies, not only on economic issues, but spilling over to other issues as well.

Administration spokesmen also convey optimism about East-West political relations in the context of U.S. technology transfer policy. (Remarks of William Schneider, Jr., Under Secretary of State for Security Assistance, Science and Technology at World Business Council, March 22, 1963). Although this theme is not stated as explicitly as that of western concord, the implication is that effective U.S. policies are in force to control technology transfer to the East, and that where problems did exist, they are manageable. For example, a U.S. policy of differentiation definitely is in effect toward the East. There is a certain amount of contradiction between that

and U.S. policy on technology transfer. One way of dealing with this problem is to keep an especially close check on those goods which can be "reverse-engineered."

Another implication drawn from executive branch spokesmen's statements is that the Reagan Administration's relatively tough line on restraining technology transfer to the East has been correct all along, even though the Administration had to abandon its anti-pipeline sanctions in November 1982. The game is definitely worth the candle in their view. U.S. allies are much more willing now to accept the U.S. stand on controlling technology transfer to the East. The U.S. position has been aided by the exposure of clumsy Soviet "collection" techniques—witness the expulsion of a large number of Soviet diplomats from France in 1983.

Cocom is enjoying a renaissance of concord—the best since the 1950s. Multinational cooperation is really quite good, according to the Administration.

Despite this self-justification, there seemed to be some moderation of administration rhetoric regarding East-West trade and technology transfer. Few spokesmen currently advocate the policy associated with Richard Pipes (senior NSC adviser on Soviet affairs, 1981–82). This policy, which seemed at times to have President Reagan's support, sought to maximize economic pressure as a way either of influencing Soviet behavior or of punishing Moscow for "negative" behavior. Instead, Administration officials claim to eschew "economic warfare" against the U.S.S.R. and affirmed the mutually beneficial character of U.S.-Soviet trade and (limited) technology transfer. The Administration believes that there is a place for U.S.-Soviet economic exchange—grain as well as techology—but it must be on the basis that it does not enhance the Soviets' strategic positions, and it must be on economically sound and equitable terms. The Administration avoids economic warfare, per se, against the U.S.S.R., for example, the restrained Administration response to the Soviet downing of the Korean airliner. But the Administration does take Soviet actions elsewhere into account, e.g., Afghanistan, Poland, human rights issues.

It is possible, however, that there is still discord within the Administration on basic East-West trade and technology transfer policy. One approach, associated with detente, calls for a broad expansion of trade in all areas except those of direct military significance. In this view, a large trade volume would become a major link in a network of mutual benefit of interdependence. The benefits to Moscow of this trade would provide an incentive for Soviet restraint in other areas. The mutually beneficial trade would act as a shock-absorber, reducing the intensity of political tension in areas of continued superpower rivalry.

Toward the other end of the spectrum are those who view the Soviet bloc as econimically dependent upon the West (but not vice versa) so that East-West trade and technology transfer confers a one-sided advantage on the East, mitigating the adverse economic consequences of the Communist regimes' repressive and militaristic policies. In this view, a combination of economic, social, and political crises within the U.S.S.R. makes it peculiarly vulnerable to Western economic leverage, which should be used to force Moscow to choose between moderating its militaristic, expansionist policies, or accepting the adverse consequences of its economic inefficiency.

Somewhere between these two positions are proponents of linkage, who see East-West trade and technology transfer as a useful "carrot" and/or "stick" with which to influence Soviet behavior.

A fourth approach would recognize a minimal governmental responsibility to control the export of militarily sensitive goods to the East, but would otherwise severely restrict U.S. governmental regulation of East-West trade, allowing the market place to determine economic relations.

Approach number one (detente) and number four (laissez-faire) do not have prominent spokesmen in the Reagan Administration, although it is possible that elements of the bureaucracy (especially in the Departments of State and Commerce) are quietly inclined toward the detente approach, and elements of the business community (on which the Administration relies for political support) favor the laissez-faire approach. There is evidence, however, of rivalry and discord within the Administration between advocates of the linkage/carrot-and-stick approach, and proponents of the hard line anti-trade policy. (CRS Issue Brief 83066, U.S.-Soviet Relations.) This was especially evident as the Administration and Congress struggled with the task of reviewing and/or renewing the Export Administration Act of 1979. The Administration has broadened its definition of technology to be restricted. The Department of Defense has taken the lead in defining militarily critical technologies and defense critical industries.

One indication of internal discord is in Administration views of economic sanctions and embargoes, e.g., against the U.S.S.R. and Poland. Some voices indicate that although such sanctions are not without cost to the United States, they were

necessary and useful in conveying the depth of U.S. displeasure. The sanctions may also have been effective, it is argued, in helping to dissuade the Soviet or Polish authorities from taking even more extreme action. Others believe that the economic sanctions were more costly to the United States than to the target nations, and were largely ineffective, because of the priority accorded by Moscow (and Warsaw) to political over economic considerations.

Finally, it is curious to note that the Administration, in its written responses seemed to find numerous justifications for President Carter's 1980 grain embargo, despite President Reagan's subsequent criticism of and termination of that embargo is said by some to go against the Administration's contention that democracies must show the Soviets their willingness to endure sacrifices in order to defend their principles.

7. TRADE SANCTIONS AND CONTROLS*

1. Background

All countries of the OECD and CMEA link trade and diplomacy. Differences arise in the political objectives set for their commercial policies and the instruments used to achieve them. During the last decade a number of developments have brought these differences into focus. In particular, they include: (1) the conclusion of the 1972 U.S.-U.S.S.R. Trade Agreement involving bilateral trade facilitation, government credits, and MFN on the part of the U.S. and the settlement of Lend-Lease debts, trade facilitation, measured acceptance of freedom of emigration, and acceptance of codes of conduct on the part of the Soviet Union; (2) selective domestic issues in the U.S.S.R., for example, dissident or refusenik actions, harassment of U.S. officials or citizens; (3) the 1979 Afghanistan invasion and partial U.S. grain embargo and sanctions; and (4) the imposition of martial law in Poland and U.S. sanctions.

With the removal in November 1982 of the U.S. sanctions on energy equipment, four Alliance studies on credit, licensing, energy and East-West trade policy were initiated.

(1) General Premises: A general reassessment of objectives and strategies of Western economic relations with the East, especially the Soviet Union, undertaken within the NATO Economic Secretariat, Brussels; (2) Strategic Trade: A reexamination of strategic trade controls within the Coordinating Committee for Multilateral Export Controls (CoCom), Paris; (3) Energy; An evaluation of benefits and costs in energy trade, especially import of Soviet gas and export of Western energy equipment, based in the International Energy Agency, OECD, Paris; and (4) Credit: An exploration of possible ways to harmonize credit policy and thereby reduce the prospect of subsidization or provision of preferential credit to the U.S.S.R. and other Communist countries. This study has been undertaken within the Organization for Economic Cooperation and Development (OECD) Paris. A fifth study, a general OECD study on East-West economic relations, was added after the President's announcement. This general study, briefed to the OECD Council of Ministers in Paris, May 10–11, 1983, presumably parallels the NATO study.

Progress made in the studies was referenced in the Joint Statement released during the Western Economic Summit in Williamsburg, May 28–30, 1983:

> We note with approval the work of the multilateral organizations which have in recent months analyzed and drawn conclusions regarding the key aspects of East-West economic relations. We encourage continuing work by these organizations as appropriate.

On June 20, 1983 Allen Wallis, Under Secretary for Economic Affairs, said in a speech before the American Society of Business Press Editors that the Alliance studies represent the "(s)tart of a process that will examine East-West economic relations as they develop and will provide informed analysis for the use of policymakers." He also noted that the "(s)pecific efforts" that are still in process include:

> An effort in COCOM to strengthen that organization and examine whether members' security interests require controls on additional high technology items;
>
> Continuing work within NATO on the security implications of East-West economic relations;
>
> An analysis in OECD of the balance of economic advantages in East-West trade; and
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> The ongoing study of national energy policies and Western energy security.

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In addition to these multilateral studies on East-West trade policy, the United States has been reconsidering its own policy. The 98th Congress (1983-84) concerned itself with several legislative statutes affecting U.S. trade policy toward the East. These included: the 1979 Export Administration Act, the 1983 Export-Import Bank Act Amendments and amendments to the Tariff Act of 1930.

The EAA of 1979, like its predecessors the Export Control Act of 1949 and the Export Administration Act of 1969 (amended in 1974 and 1977), establishes the basis of U.S. trade policy with the East. Under this Act, export licensing is regulated in accordance with U.S. security interests, American foreign policy objectives, and, to a lesser extent, limitations on domestic supplies. It was the EAA that empowered Presidents Carter and Reagan to restrict U.S. commercial relations and, in the case of the "pipeline episode," European commercial relations with the U.S.S.R. This law was amended in 1981 in order to counteract more effectively Soviet efforts to obtain U.S. technology. The Reagan Administration wanted to see additional changes made in the Act to tighten further U.S. control over high technology exports.

The EAA expired on September 30, 1983 and was debated throughout the 98th Congress. The two bills finally reported out of the Senate Banking Committee and the House Foreign Affairs Committee were S. 979 and H.R. 3231. A version of the House bill was passed in October 1983; the Senate passed its bill in March 1984. Each addressed the issues of national security and foreign policy controls with the Senate bill generally reflecting a more restrictive policy on national security controls. The House bill included some provisions on foreign policy issues outside the East-West framework, such as repression in South Africa.

The Senate bill was highly controversial among U.S. allies. It granted the President the power to ban imports from any foreign country found in violation of U.S. East-West trade controls. This provision was retained in the Senate bill despite the lobbying efforts of the Europeans. In a letter sent to the Senate Banking Committee in late May 1983, Sir Oliver Wright, the British Ambassador, maintained that: "In an alliance of democratic sovereign nations there can be no question of one ally imposing its will on another." Sir Wright also expressed that "there has to be genuine consultation, compromise and give and take."

The conference on amending the 1979 Export Administration Act failed to strike a compromise prior to adjournment in October 1984. The final tradeoff proposed was for the Senate to give up its demand that the Pentagon assume more responsibility in the licensing of strategic exports (thereby weakening the role of the Commerce Department) in return for the House dropping the demand for a ban on new U.S. loans to South Africa. The two sides had reached an agreement on the controversial contract sanctity provision. Ultimately, the House was unable to accept a new EAA that did not provide for a ban on loans to South Africa.

Without an Export Administration Act, U.S. export licensing policy is carried out under the auspices of the International Economic Emergency Powers Act (IEEPA) invoked by the President in March 1984. In contrast to the EAA, the IEEPA does not prevent judicial review of the Government's export licensing decisions. Many policymakers are therefore concerned that the Government will face considerable court challenges until a new act is enacted. The reconsideration of the EAA in the 99th Congress however may mean starting over, that is reaching an agreement once again on such controversial issues as: how much East-West trade should be controlled, how great the roles of the Pentagon, Customs Service and the Commerce Department should be in export licensing, and under what conditions contract sanctity should be provided.

Meanwhile, the 1983 Export-Import Bank Act Amendments were passed in November 1983 without significantly altering U.S. policy toward Eastern trade. The Trade Remedies Reform Act was also taken up during the first session of the 98th Congress. This new piece of legislation (S. 1351), introduced by Senator Heinz, proposed to amend the Tariff Act of 1930 to provide a special remedy for the artificial pricing of articles produced by non-market economies.

As the U.S. continues to work at home and abroad for a consensus on East-West trade policy, the Government has retained some of the bases for increased economic relations with the Soviet Union. The 1974 U.S-U.S.S.R. ten-year agreement on economic, technical and industrial cooperation was renewed in June 1984. This general economic agreement provided for the establishment of an official U.S.-Soviet Trade Commission, which has not met since the Afghanistan invasion in 1979. Some lower level meetings, however, are scheduled for January 1985, with Under Secretary of Commerce for International Trade Lionel Olmer representing the United States and Deputy Foreign Trade Minister Nikolai Sushkov representing the U.S.S.R. The

agreement furthermore sketched out a broad framework for U.S.-Soviet trade relations, stressing such possible areas of cooperation as: food processing, timber, ferrous and non-ferrous metallurgy, natural gas and oil, the engineering industry, and the extraction and processing of high-energy-consuming minerals. According to the agreement, both countries were to make efforts to facilitate and encourage further trade.

2. Commentary

The balance between economic benefits and strategic costs is an important consideration in American East-West trade policy deliberations. The American debate involves a unique juxtaposition of economic strategic costs and benefits because of the U.S.-U.S.S.R. Great Power rivalry. The other OECD nations do not perceive Soviet economic development as a threat to their security. They do not have the same degree of overall responsibility for Western security as the United States.

The Reagan Administration views U.S. commercial relations with the Soviet Union as a function of overall U.S.-Soviet relations. As U.S.-Soviet relations have hit a low period, so too has bilateral trade. This is not to say that trade has halted, or that new agreements in certain areas have not been signed. Rather it is to note that American-Soviet commercial dealings have been selective and few, limited mainly to the grain trade. The Administration holds out the possibility of increasing commercial relations, but improvements in this area are likely to be influenced by improvements in the other major areas of concern in U.S.-Soviet relations: arms control, regional issues, and human rights. At present, the U.S. has been trying both at home (i.e., the Congressional debate over the Export Administration Act) and abroad with its Allies to reach a consensus on East-West trade issues that can be translated into workable policies. Even with passage of an amended Export Administration Act, the current debate among American policymakers is not likely to end. Regardless of the provisions of this new law, successive administrations may implement the Act according to different philosophies.

On the multilateral side, as has been referenced in various place in this report (See: Appendix 2, Sections 1, Background Facts About East-West Trade, and Section 6, Trade Parameters and Political Relations and Technology Transfer), the U.S. and its Allies have been working on a number of studies keyed to main areas of East-West trade. As of the end of 1984, the Alliance studies appear to have identified the bases of agreement in principle. Further consultation and study appear necessary to develop agreement in practice. Some see the progress as mere papering over of differences that may exacerbate in time; others see the Alliance studies as representing more consultation and improved mechanisms for attaining agreements and coordinated actions.

The points of controversy in U.S. trade policy seem to center on the use of foreign policy criteria in export regulation, that is, linking specific exports (e.g., energy equipment) to specific Soviet foreign policy or internal issues, and on the conditions of "normalized" trade with the U.S.S.R., that is, issues of credit, controls on strategic exports, and the use of both carrots and sticks in trade.

Regarding the usage of sanctions and embargoes as tools of American foreign policy, post facto assessments of President Carter's and President Reagan's actions have brought into question the utility and effectiveness of sanctions and embargoes as foreign policy instruments. In the case of the Afghanistan sanctions, particularly the grain embargo, President Reagan made the following remarks when he announced the lifting of the embargo in 1981:

> In the spring of 1981, I lifted the grain embargo imposed by the previous administration, because it was not having the desired effect of seriously penalizing the U.S.S.R. for its brutal invasion and occupation of Afghanistan. . . Increase sales by other suppliers substantially undercut the tremendous sacrifices of our farmers, and I vowed at the time not to impose a grain embargo unilaterally unless it was part of a general cutoff of trade between the U.S. and the Soviet Union. . . Grain sales have little impact on Soviet military-industrial capability. They absorb hard currency earnings and feed the people of the Soviet Union who are suffering most from the disastrous economic policies of the Soviet Government. (*Department of State Bulletin*, October 1982, pp. 40–41).

By paying higher prices, incurring some inconveniences and opportunity costs, the Soviet were able to import elsewhere almost all of the U.S. embargoed grain. The Soviet economy suffered a modest, indeterminate cost.

Relative economic impact aside, the U.S. sanctions (a) did not reverse the Soviet invasion of Afghanistan, (b) did dramatize U.S. disapproval of the Soviet aggression

and sustain attention to the matter in world opinion, (c) did impose some concrete cost on the action, and (d) probably encouraged Afghan resistance modestly. Aside from some participation in the U.S.-led boycott of the Moscow Olympics, the West European response was mainly exhoratory disapproval.

In the case of the Polish sanctions, particularly the 1981–1982 energy sanctions, given the evident Soviet interest in maintaining Poland as a dependable ally central to the viability of the Warsaw Pact, there was little reason to suppose that these sanctions would change the Soviet positions on the Polish workers movement. As a foreign policy instrument the pipeline sanctions (a) perhaps imposed minor delays and costs on Soviet economic projects, (b) dramatized U.S. disapproval of the suppression and the Soviet role in it as well as the lack of effective tools to affect the situation short of military action, (c) dramatized the potential risks and U.S. fears of West European dependence on the Soviet Union, and (d) triggered an injurious dispute in the Western alliance.

"U.S. firms (have) lost at least $800 million worth of potential business with the Soviet Union . . ." as a result of the energy sanctions, according to Under Secretary of State James Buckley (Department of State Bulletin, September 1982, p. 38). Lionel Olmer, Under Secretary of Commerce for International Trade, meanwhile, said that business losses for the next 3 years had been estimated at $2.2 billion, most of which he felt could be recouped (*New York Times*, Nov. 15, 1982, p. A10).

The U.S. lost significant shares of Soviet markets as a result of both the Afghanistan and Polish sanctions. The Soviets were able to secure, albeit with some financial inconveniences, alternate suppliers. Countries such as Argentina and Australia expanded their grain production and export capabilities to meet the Soviet demand; firms like the Japanese company Komatsu filled the orders originally intended for U.S. companies such as Catepillar.

In defining the terms of "normalized" trade with the Soviet Union, the Administration has generally taken a more restrictive position than its allies, and has been trying to develop a reasonable policy somewhere in between total embargo and total free trade. Some propositions shared by the U.S. and its Allies are identifiable.

First, they all agree on the desirability of established limits on normal commercial relations in order to avoid directly enhancing the Soviet military capability. Specifically, they all support the maintenance of the agreed upon basis of CoCom export licensing—denial of exports of military significance. Restrictions on security related exports to all Eastern countries are also seen as appropriate.

Second, they agree on the desirability of a common policy on credit. Accepting the fact that the Soviet Union and Eastern Europe are viewed differently by individual Western countries in terms of interests and policies, Western trade with the Eastern bloc, and with all Communist countries, should be considered on the basis of individual countries, i.e., a differentiated policy. A differentiated policy would include general guidelines while also taking into account specific differences in national practices, interest rates, and competitive conditions. The requirements of commercial profitability should serve to preclude heavy subsidization over the long term.

Third, they see an interrelationship between trade and diplomacy in East-West relations as inevitable. The West does gain economic benefits from Eastern trade. The East is viewed as a potentially growing and economically attractive market in the long run. Moreover, economic relations are a part of the overall conduct of diplomacy. Because of the Eastern need for Western technology, grain and credit, trade would be expected to be used for further diplomatic goals. Both using a stick and withholding a carrot may be useful in diplomacy.

Despite this agreement on some general issues in East-West trade policy, U.S. unilateral policies and positions differ from those of its Western allies in very specific ways. The U.S. is the only OECD country that: defines strategic goods to include products and technologies that have only indirect military implications, views the weakening of the Soviet economy as an appropriate factor in determining trade policy, and includes "foreign policy criteria" in either export licensing or the imposition of embargoes and sanctions.

Moreover, the political and economic value of East-West trade to the U.S. seems to vary in accordance with the overall state of U.S.-Soviet relations. Evidence of this variation can be found in a comparison of views expressed by U.S. Government officials before and after the Soviet invasion of Afghanistan and the subsequent imposition of the U.S. grain embargo. In the Appendix to the *Issues in East-West Commerical Trade* report of the Joint Economic Committee, 1979, (pp. 287–297) several top-ranking Administration officials commented that East-West trade was important to U.S. business, as well as beneficial for U.S.-Soviet relations in general. The statements, written in response to a letter from then JEC Chairman, Richard Bolling, were in marked contrast to many of their public comments and statements made

over a year later. The response of the Secretary of Commerce, Juanita M. Krebs, to Chairman Bolling on April 3, 1978, is especially interesting, as the following excerpt indicates:

Question (3) (a). "To what extent should we now view trade relations with the Eastern countries as 'normal' commercial relations?"

Answer. We see "normalized" trading relationships with the communist countries as implying continuation of the control of strategic technology exports, but providing them the same trading privileges (MFN, official credits, etc.) as those available to our other trading partners. Under this definition we now have "normal" trading relationships with Poland, Romania, and Yugoslavia, but not with the other communist countries. Existing legislative restrictions made further progress toward normalized relations with the U.S.S.R. extremely difficult, although it is possible that Hungary may receive MFN and Eximbank credits this year under the terms of the Trade Act of 1974.

Question (3)(b). "To what extent should our continued adversarial relations dictate limits on our exports, especially of high technology products of military significance?"

Answer. For the foreseeable future, exports to the communist countries of strategic products should continue to be stringently controlled. Within the bounds of these restrictions, however, it is U.S. policy to expand trade with the communist countries. *We believe this policy must be followed consistently and not on a "stop and go" basis, if the economic and political benefits of increased trade are to be realized.* [Emphasis added.]

Question (3)(c). "Can economic bargaining pressure be effectively utilized to change or moderate the adverse or threatening aspects of Eastern societies that run counter to our perceived national interests or minimum standards of conduct?"

Answer. Apart from complete embargo, the tools most frequently suggested for effecting leverage are withholding or controlling access to the following: Non-discriminatory tariffs (MFN); official export credits; high technology exports; and grain exports.

Non-discriminatory tariffs. Quantitative estimates of the probable impact of MFN on the ability of the communist countries to export to the United States indicate that the effect would be relatively small and, hence, not of great economic importance to them in the foreseeable future. The principal exports of the Soviet Union, for example, are raw and semiprocessed materials that fall into the low to no tariff categories, even without MFN. It will be many years before the composition of Soviet exports could shift towards a large volume of manufactured goods of the type that presently incur high discriminatory U.S. tariff levels.

Official export credits. Availability of official export credits would be useful to the communist countries, particularly those of Eastern Europe. However, normal country limits exercised by the Export-Import Bank would probably preclude credits of the size that would be needed to accommodate the enormously expensive natural resource development projects contemplated by the Soviet Union. Only if sufficient U.S. industry and government support for these projects were to develop could special Eximbank credit lines be created.

The current potential leverage in unilateral U.S. credit restrictions therefore appears negligible. Further, the Soviet Union has had no difficulty in obtaining large commercial bank credits and official government loans and guarantees from Western Europe and Japan, and recent experience has shown that it is difficult for Western countries to coordinate credit policies in order to exert leverage. Finally, despite the availability of open, undrawn credit lines in Western Europe, the Soviet Union has evidenced a reluctance of late to greatly increase its already large debt burden.

High-technology exports. Except for certain highly specialized advanced products, including certain types of oil and gas field equipment, and products with military application to which Western countries now apply joint export controls through the COCOM mechanism, the United States has little means of controlling the flow of Western technology to the communist countries. *Most items of non-strategic technology that we might try unilaterally to keep from the communists would be available to them from firms in other Western countries which have not evidenced a willingness to use their East-West trade as a bargaining lever.* [Emphasis added.]

Grain.—The use of restrictions on sales of foodstuffs as a weapon to achieve political objectives could set a dangerous precedent, running counter to U.S. positions on the use of oil embargoes by the Arab countries for political ends. Sec-

ondly, a food embargo would be contrary to our nation's humanitarian and moral traditions and would encounter extremely adverse world opinion. Thirdly, U.S. farmers would be significantly injured by a unilateral U.S. ban that succeeded in barring U.S. grain from the communist countries, while communist purchases from other Western grain-exporting nations (Canada, Australia, Argentina, France) would vitilate the effect of the U.S. ban. If transshipments of grain could not be stopped, a U.S. embargo would be virtually useless. Finally, access to U.S. grain, even in poor communist country harvest years, is only marginally important to the communists: they require the additional grain primarily to maintain livestock production levels, rather than for basic human consumption needs.

The conclusion must be that the ability to use economic leverage unilaterally to achieve non-economic objectives is very sharply limited. Political accommodation and change on the part of the communist countries appear more likely to emerge from normal trading relations with the West including the United States, than to be exacted by the U.S. as a quid-pro-quo. *Comprehensive, continuing contacts between East and West hold the greatest promise for advancing U.S. interests over the long term.* [Emphasis added.]

In the future U.S. policy will likely tend toward one of three basic policy courses:

1. A *discriminatory policy* of restricting Eastern access to Western technology and credits. Such a policy would be an extension of the sanctions imposed by the Carter and Reagan Administrations. In classical economic terms, this policy could be called neo-mercantilist and, in more political terms, economic warfare.

2. A *neutral policy* of governmental non-intervention in East-West trade. Since the forces of supply and demand would determine Soviet access to Western goods and credits, this policy may be considered a market policy. It may also be termed a *laissez faire* policy.

3. A *competitive policy* of active government promotion of East-West trade, particularly, by offering Eastern countries guaranteed access to supplies and favorable terms for credits. This policy may also be called the Helsinki option after the Final Act signed there at the conclusion of the Conference on Security and Cooperation in Europe in 1975. This policy of government intervention to stimulate trade represents the normal export promotion policy of most OECD countries and is consistent with the commercial principles enunciated in "Basket Two" of the Helsinki Final Act.

The Europeans could follow the U.S. in adopting either a discriminatory or a competitive approach to Eastern trade. If not, Western policy would be divided, resulting in a situation similar to the one that currently exists. Such a lack of consensus might force the U.S. out of Eastern markets, both agricultural and industrial.

The United States lost its predominant share of the Soviet grain market as a result of the partial embargo 1979–80. This share dropped from approximately 75% in 1978–79 to 35% in 1981–82; in 1983–84, the U.S. share of the Soviet grain imports was even less. Secretary of Agriculture Block has argued that the impact of the 1980 embargo on 1982 earnings from U.S. grain exports was as much as $3 billion. Others, such as the Argentinians, Canadians, French, etc., have benefitted from the U.S. losses. It is uncertain whether the United States will regain its former position in the Soviet grain market as the "primary supplier," even with the new LTA signed on August 25, 1983.

Likewise, if the U.S. Government continues to diminish U.S. business opportunities and competitiveness in Eastern markets through its expressed policies, lack of official credit, etc., American firms might find themselves completely out of the Eastern market. U.S. industrial trade only accounted for approximately 30% of U.S. exports to the U.S.S.R. in 1983 according to the International Trade Commission. Moreover, as shown by the pipeline incident, if the United States will not sell goods and technology to the Soviets, other foreign Western supplies are available and European and Japanese firms are eager to trade in "non-military" technology.

Finally, if the Americans and the Europeans do not exhibit some flexibility in formulating an East-West trade policy consensus, problems might arise over policies in other areas, e.g., basing of U.S. missiles in Europe (INF), U.S.-EEC trade (steel and agriculture), North-South issues. It could be considered mechanical to relate directly U.S. policy on troops in Europe to trade issues in a functional way, though such issues are surely interconnected in diplomacy. In addition, the potential for European and American cooperation in other global forums could be adversely affected by disputes on East-West trade issues. Whereas consensus on economic issues could facilitate agreement on other outstanding Alliance issues, the heat of disagreement on trade with the East might encourage erosion in Alliance consensus in a variety of political and military areas.

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8. FINANCE*

1. Background

The capital resources of the U.S. economy are limited. When the U.S. Government or U.S. private lenders extend credits to the Soviet Union or Eastern Europe to finance trade, they divert capital away from some alternative domestic or international use.

The international lending activities of such official agencies as the Export-Import Bank (Eximbank) and the Commodity Credit Corporation (CCC) are also constrained by efforts to reduce the U.S. Government budget deficit. In choosing among possible recipients of official export credits, Eximbank and CCC have traditionally decided on the basis of the creditworthiness of borrowers and the competitive needs of U.S. exporters. Given their limited resources, however, those agencies could choose to extend financial assistance exclusively to developing countries, on the grounds that such borrowers have greater need than others.

U.S. official lenders and their counterparts in other Western countries try to promote exports by extending export credits at terms that are better than those offered by private commercial lenders. The Soviet Union and Eastern Europe have benefited from such preferential credits, thus spending less on Western goods than they otherwise would.

The U.S. Government has followed a restrictive policy with respect to official credits in East-West trade: the Soviet Union and most East European countries are not eligible for Eximbank and CCC credits. Other Western countries, however, consider official credits a normal part of commercial relations with all countries, including the Soviet Union and Eastern Europe. Although other Western governments have agreed to adhere to international guidelines setting minimum terms for credits to the East, they have insisted on continuing to use official credits in East-West trade.

2. Commentary

Official export credits played an important role in the expansion of East-West trade in the 1960s and 1970s. Indeed, without official credits it is unlikely that commercial relations between East and West could have developed so rapidly. To some extent, all of the Eastern countries have suffered from chronic shortages of hard currency. They have been unable to sell enough goods on Western markets to pay for needed imports of Western technology and agricultural products. To promote exports to the East, most Western governments have extended official export credits at interest rates and repayment terms that are better than those available from private financial institutions.

U.S. Government official export credit institutions—the Export-Import Bank (Eximbank) and the Commodity Credit Corporation (CCC)—have generally been more restrained than their West European and Japanese counterparts in financing East-West trade. The Administration's response to questions about financing East-West trade notes that the Jackson-Vanik Amendment to the Trade Act of 1974, enacted in January 1975, constrains the ability of Eximbank and the CCC to extend credits to the Soviet Union, Bulgaria, Czechoslovakia, the German Democratic Republic and other non-market economy countries. The Amendment links eligibility of such countries for U.S. official credits to their emigration policies. Poland, which was formerly eligible for official credits, has been declared ineligible as part of the economic sanctions imposed by the United States after the declaration of martial law. Yugoslavia, Romania, Hungary, and China are currently eligible for official credits.

The governments of Western Europe and Japan have not imposed such restrictions on official credits for the Eastern countries. Generally, those governments have considered East-West trade more important to their economies and to their overall relations with the East. Most Western governments have considered official export credits, extended as preferential terms, a normal and necessary ingredient of their trade with the East. Consequently, they provide official credits to all Eastern countries, including those that do not have access to U.S. official credits.

The Reagan Administration, like past administrations, has negotiated with other Western governments to limit the use of subsidized official export credits. The Administration's response expresses confidence that the most recent negotiations, which culminated in the signing of the International Export Credit Arrangment, has largely eliminated interest rate subsidies. Some U.S. exporters contend that

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*Prepared by George Holliday, Specialist in International Trade, Economics Division.

other governments have not always observed past agreements on export credits. They are concerned that violations may continue, putting U.S. exporters at a competitive disadvantage in Eastern markets.

Even if all subsidies are removed from official credits, Western governments may still play an important role in providing foreign buyers with access to credit which they would not otherwise have. Given the continuing shortage of hard currency among the Eastern countries, access to official export credits is likely to remain an important determinant in their choice of Western suppliers. The prospect that official credits may continue to play an important role in East-West trade raises important questions for U.S. policy makers. Should Eximbank and CCC play a more active role in promoting exports to eligible Eastern countries? Should the U.S. Government consider making other Eastern countries eligible for official credits? To what extent will budgetary constraints hamper the ability of Eximbank and CCC to participate in financing East-West trade? The Administration's response does not address such questions concerning U.S. export credit policy.

9. NUCLEAR POWER*

1. Background

Ever since the early days of atomic energy after World War II, there have been two schools of thought about the effects upon possible nuclear weapons spread of the widespread use of nuclear power. One holds that because many of the materials, technologies and facilities are common for both the generation of nuclear electricity and for the manufacture of atom bombs, it is difficult, if not impossible, to keep the civil and military uses separated except by strong international control. The other holds that nuclear power can be widely developed for peaceful uses if done openly subject to national commitments not to make nuclear weapons, commitments verified by international inspection, but not subject to international control. The linkage seen by some between civil nuclear power and nuclear weapons gives rise to the uneasiness with which some analysts view the spread of nuclear power in more countries. From their point of view, this spread will strengthen national nuclear industries' bases which later might be used to produce the materials for and to develop and make atom bombs. A further spread of nuclear weapons, or of the ability to quickly make them, to many new states is intuitively thought to entail political, economic and security disadvantages to the United States. A world with more nuclear weapons states is expected to be less stable than one with few nuclear weapons states, and more likely to present an increased risk of use of atom bombs that according to some analysts might, in turn, trigger general nuclear war between the United States and the Soviet Union. Short of that extreme situation, the spread of a nuclear industrial base to problem states probably would complicate the international political dealings of the United States, and possibly endanger its national security and that of some allies. Such a spread, on the other hand, could mean revived export markets for the U.S. nuclear industry, and arguably create balances of terror between traditional opponents.

If thinking about transfer of nuclear technology to the Soviet Union, Eastern Europe and China is to have some reality, there must be some consideration of the balance between benefits and dangers. Congress, in enacting the Atomic Energy Act of 1946, virtually banned U.S. cooperation in nuclear power with other states, thereby indicating its views of the potential dangers. Even the Atomic Energy Act of 1954, which opened the way for greatly expanded U.S. nuclear cooperation with most states, supported a general presumption against nuclear cooperation with the Sino-Soviet bloc. The principal reason with respect to the Soviet Union is clear. It was and is viewed as the principal adversary of the United States on the world scene. This view has led to U.S. policies to limit or prevent transfers of technologies that could help to build the Soviet war machine. Similar reasons dominated U.S. thinking about the People's Republic of China until recently. Now U.S. relations with China have changed enough for nuclear cooperation to receive serious attention and consideration. Comparable prospects for such cooperation with the Soviet Union appear to remain dim, although the United States has indirectly aided Yugoslavia's nuclear power efforts.

Since 1946 there have been almost no approved exchange of nuclear technology by the United States with either the Soviet Union or China. What little there has been has been limited to exchange of unclassified scientific and technical information in

* Prepared by Warren Donnelly, Senior Specialist in Conservation and Energy, Environment and Natural Resources Division.

the open literature and occasional visits. Transfer of unpublished nuclear power technology has not been permitted. The opening up of U.S. nuclear cooperation with other states by the Atomic Energy Act of 1954 did not open the door for cooperation with the Soviet Union or China. Nonetheless, any consideration of future U.S. nuclear cooperation with either of these states should begin with a review of current U.S. policy.

For the first decades of the nuclear age, the United States had a monopoly on supply. There were no competitors in the supply of nuclear technology and items, so the United States could set whatever conditions it desired for its nuclear cooperation. That situation has changed. Other nuclear suppliers now exist. They now include France, West Germany, Canada, Japan, and the Soviet Union. While China is reported to have made some nuclear transfers, these appear to be few and little is known about them. In principle, both the Soviet Union and China could benefit from receipt of nuclear technology from suppliers other than the United States. So it is logical to inquire what the policies of such suppliers are concerning transfers to the Eastern nations.

The U.S. nuclear industry, as do its counterparts in other major nuclear supplier states, urgently needs new orders to keep its present production capacity intact. Conventional wisdom holds out some hope that transfer of U.S. civil nuclear power technology to the Soviet Union and to China could lead to some small orders for U.S. industry and, more importantly, perhaps open the way for major new contracts to supply large nuclear power plants. This wisdom would benefit from a vigorous scrutiny before decisions are made about opening U.S. nuclear cooperation with these states. Similarly, conventional wisdom holds that increased U.S. nuclear cooperation would help to improve the political climate between the United States on one hand and the Soviet Union and China on the other. Here again, there is room for skepticism.

Consideration of possible U.S. nuclear trade with the Soviet Union and China begins with the fundamental question of what conditions would these governments have to meet in order to open the door to such cooperation. In light of strained relations between the United States on one hand and the Soviet Union and China on the other, it would seem reasonable to expect that some special political, military and other conditions for nuclear cooperation would be obtained beyond those required by statute.

Central to U.S. non-proliferation policy is restraint in supply of sensitive nuclear technologies, at least to some countries. Correspondingly, the U.S. would prefer that other nuclear suppliers exercise similar constraint. This is the basis of U.S. initiatives that led to the voluntary Nuclear Suppliers Guidelines announced in 1978, by the United States, and other suppliers including the Soviet Union. That country today is a potential major nuclear supplier and enjoys a virtual monopoly for countries within its sphere. China, on the other hand, is far from a nuclear supplier status. Nonetheless, there has been some concern about reported Chinese nuclear supplies to some problem states.

Once the Nuclear Proliferation Treaty [NPT] was in place in 1970, the general presumption was that unrestricted transfers of nuclear power technology could go forward within acceptable risks that the spread of nuclear technology would not lead to the further spread of nuclear weapons. This presumption was disabused in 1974 by India's test of a nuclear explosive and shortly thereafter by certain contracts involving supply of some sensitive nuclear technologies to states about whose nuclear intentions the United States was suspicious. Ever since there has been a continuing difference of opinion between those who would impose new conditions upon nuclear cooperation and those who argue that the no-nuclear-weapons-pledge of the NPT verified by international inspection is enough. This difference is likely to be clearly, and perhaps painfully evident at the third review conference for the NPT in 1985 and in a U.N. Conference on Peaceful Uses of Nuclear Energy expected for 1986.

2. Commentary

President Reagan, in his nuclear non-proliferation policy statement of July 16, 1981, has indicated his views on the consequences of further spread of nuclear weapons. Addressing major challenges in international affairs facing the United States, he said:

> One of the most critical is the need to prevent the spread of nuclear explosives to additional countries. Further proliferation would pose a severe threat to international peace, regional and global stability, and the security interests of the United States and other countries. Our nation has been

committed on a bipartisan basis to preventing the spread of nuclear explosives from the birth of the atomic age 35 years ago. This commitment is shared by the vast majority of other countries. The urgency of this task has been highlighted by the ominous events in the Middle East.

As for risks from the spread of nuclear power technology, the President addressed this obliquely, saying that one of the basic guidelines for U.S. policy is to "continue to inhibit sensitive transfers of nuclear technology, equipment and materials, particularly where dangers of proliferation demand." [1]

There is general agreement on several apparent disadvantages from the unrestricted spread of nuclear power technologies, disadvantages that would be influenced by the future trend of nuclear power. These disadvantages would be greater in a world where many non-nuclear weapons states had nuclear power plants and could produce highly enriched uranium and/or plutonium. They would be greatest in a world of widespread commercial production and use of plutonium for nuclear fuel, and of advanced isotope separation technologies that would permit easy upgrading of commercial grade plutonium to weapons grade. In such a world, many industrial states would become, in effect, quasi-nuclear weapons states for they would possess a nuclear technological and industrial base that could readily be turned to production of the materials for nuclear arsenals. Such a world would have to depend upon today's international non-proliferation regime to keep nuclear power well separated from nuclear weaponry. This regime consists of a loose collection of treaties, voluntary international agreements, bilateral agreements, international inspection and an international inspecting agency. Within the United States, some analysts doubt that the present regime is strong enough to provide reasonable assurances against further nuclear weapons spread in a world where high grade nuclear materials are in commercial production and use; others think it is or can be made strong enough.

Some of the disadvantages widely expected from a so-called "plutonium economy" would include:

(1) Increased strains upon the non-proliferation regime which might not be able to withstand them;

(2) Increased fears by some states of suspected nuclear power activities of their neighbors;

(3) Increased risks that some state might feel threatened enough to take preemptive action against suspicious nuclear facilities, as Israel did against Iraq in June 1982;

(4) Temptation for some nuclear weapons states to help their client states with nuclear weapons if the security of the latter was threatened;

(5) Temptation to rely more upon nuclear weapons and less upon conventional forces to assure national security, which could increase the risks of nuclear wars.

The Administration's reply briefly responds to the question of benefits and dangers. Concerning the Soviet Union, it says prospects for expanded nuclear cooperation are "quite remote." Also, the Soviet Union "has never shown substantial interest in obtaining nuclear technology through cooperation with any western countries." Little benefit is seen in expanded cooperation and "(i)t is not likely that U.S.-Soviet nuclear cooperation would significantly improve the ability of the U.S. to influence Soviet behavior . . ."

The outlook for China is markedly different in the Administration's reply. It anticipates the U.S. would receive "substantive" economic benefits, which, however, are not specified. The Chinese would also benefit substantially. On the other hand, the market for the U.S. nuclear industry may be limited because of "insufficient official capital resources for the PRC . . ." The reply does not indicate what leverage nuclear cooperation with China might provide for the United States. On the whole, the Administration's reply indicates some prospects for U.S. nuclear cooperation and sales to China, but not as great as optimistically expected by the U.S. nuclear industry. There is no discussion of China's interest in nuclear power, the stage of its nuclear power program, Chinese interest in foreign technical assistance, and the response of competitors to the U.S. nuclear industry, particularly the French. The reply gives a sense of some, but not dramatic, benefits to the United States.

The outlook for nuclear cooperation with Eastern Europe is one of scant prospect, with notable exceptions in Yugoslavia and Romania. Here the Administration notes past examples, but gives no indication of future prospects. As for dangers with re-

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[1] Sensitive items refer to those related to the production of uranium highly enriched in the isotope U-235, and of plutonium. Both of these materials can be used directly to make atom bombs and nuclear explosives.

spect to the Soviet Union, the Administration refers only to non-weapons uses, saying:

> Beyond this, to protect U.S. national security interests, even in the relatively non-sensitive area of commercial power reactors, careful controls would have to be applied by the U.S. to prevent the transfer of any U.S. light water reactor technology which could be of potential utility to the Soviets in military areas such as naval propulsion.

The Administration says nothing about the role of nuclear power as a source of electricity for Soviet defense industries, or possibilities that U.S. nuclear cooperation could indirectly improve Soviet production of nuclear weapons materials.

The reply is silent about possible dangers from U.S. nuclear technology transfer to China. Nothing is said of the somewhat volatile nature of U.S. relations with China and prospects that today's friendship may return to yesterday's hostility. U.S. nuclear assistance to China probably would not directly affect its capacity to make nuclear weapons, but could be expected to strengthen its technological base which indirectly could help its war machine.

The Administration's reply gave substantial attention to current U.S. policy with its "fundamental premise" that peaceful nuclear activities "must be undertaken under a regime of effective international controls," the purpose of which is to assure that the nuclear technology supplied is not "diverted for nuclear explosive uses." Note too the Administration's statement that:

> We believe that any easing of the conditions of nuclear transfers, either technology or equipment, would run counter to U.S. non-proliferation efforts.

Also its statement that:

> We are working with other like-minded states to ensure that world-wide nuclear trade is subject to effective international controls.

Turning to cooperation with the Soviet Union and China, the Administration says that U.S. cooperation with these states in civil nuclear power has been ". . . limited and confined to exchanges of unclassified, non-sensitive information." [2] Moreover, under Department of Energy regulations the transfer of any unpublished unclassified nuclear technology would require DOE authorization.

The Administration's reply does not indicate whether under present circumstances DOE would be inclined to authorize transfer of unpublished, unclassified nuclear technology to either state. Nor does it indicate the likelihood that the NRC might license export of lesser parts under section 109 of the Atomic Energy Act of 1954, as amended, to the Soviet Union or China. There is concern in some Congressional quarters that the NRC is thinking of a change in its regulations, in 10 CFR 110, that would loosen the definition of parts which require specific export licenses.[3] [4]

For the moment, U.S. policy would continue to present tight restrictions on U.S. nuclear cooperation with the Soviet Union and China. However, the Administration had hoped to complete in 1984 its negotiations of an agreement for nuclear cooperation with China, which would substantially change this picture.

As for policies of other nuclear suppliers to the Soviet Union and China, all of them, except for France and Japan, are members of NATO and as such are participants in the international Coordinating Committee, or COCOM, through which they have applied security export controls for supply of various kinds of technologies to the Soviet Union and to China. Japan too is a COCOM member. In effect, COCOM would prevent the supply to the Soviet Union and China of many items useful for nuclear purposes.

Over the years, other nuclear suppliers, except for France, have followed the U.S. example and limited their cooperation with the Soviet Union and China to scientific and technical information in the open literature. Nonetheless, information on nuclear technology can reach these countries through papers on nuclear technology presented at various international conferences, including those sponsored by the Inter-

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[2] Sensitive nuclear information refers to that for enrichment, reprocessing, production of heavy water.

[3] There is some concern, for example, that the proposed NRC change could permit export of reactor coolant pumps without specific licenses which, in principle, could allow a U.S. company to supply such pumps for a proposed nuclear power project in China.

[4] Some Members of Congress would close what they see as a loophole in section 109 exports by upgrading the conditions for such exports, particularly to require full scope safeguards in the importing state. This is evident in the Wolpe amendment in the House to the Export Administration Act Amendments approved in September 1983 and the Humphrey-Roth-Boschwitz amendments to this legislation in the Senate on February 28, 1984, which would provide for such upgrading.

national Atomic Energy Agency. France, however, appears to have a somewhat different view, which favors nuclear cooperation with the Soviet Union.[5]

Against this background, it appears that with the exception of France, the other suppliers have followed the lead of the United States in tightly limiting their nuclear cooperation with the Soviet Union and China. France shows a strong interest in China which has yet to culminate in any substantial orders. However, the prospects of a firm order for a joint Hong-Kong China nuclear project which could be substantially self-funded could generate competitive pressures for this order that could damage this restrictive consensus.

The respective effects of U.S. nuclear cooperation with the Soviet Union and with China upon the U.S. nuclear industry probably would differ.

For cooperation with the Soviet Union, the benefits for the U.S. industry probably would be small. There appears to be little opportunity within the Soviet Union and its satellites for a competitor to the Soviet nuclear industry. The Soviet industry is well established, appears to be quite capable of supplying its clients, and probably would not welcome external competition. So prospects would be dim for orders for nuclear power plants, their major components, enrichment services, and nuclear fuel fabrication. There would be some contracts for U.S. technical assistance and perhaps design, but these probably would not be large.

For China, if the Administration can negotiate an acceptable agreement for nuclear cooperation with that government and if China can arrange for financing, then the U.S. nuclear industry could compete for nuclear orders with the nuclear industries of France, West Germany, and perhaps Japan. It seems likely that despite China's desire for nuclear independence, if it wants nuclear power soon, it will have to import plant and equipment and probably will have to buy enrichment services, perhaps fuel fabrication, and various technical services. Such orders could help the U.S. nuclear industry. However, it seems unlikely that nuclear sales to China could regain for the U.S. nuclear industry even a small part of orders lost through domestic cancellations. Also, if nuclear sales to China are opened, the orders might well be filled using equipment already fabricated by the U.S. industry for U.S. plants that have been cancelled. For example, TVA has considerable surplus nuclear power equipment that it would like to sell to China. So U.S. nuclear cooperation with China could enable the U.S. nuclear industry to liquidate some surplus production, but might not result in new work for its factories.

Concerning the effects on U.S. political relations with the Soviet Union and China, while some effects could be anticipated, they probably would be small, particularly in comparison with effects of other factors affecting these relations. Any U.S. nuclear cooperation with the Soviet Union, would imply an improvement in U.S.-Soviet relations, i.e., a new détente. In this case, nuclear cooperation presumably could help strengthen the postulated improved relationship. For China, here too some political benefit might be expected. However, it would be limited by China's policy of nuclear independence which, if successful, would limit U.S. cooperation in both scale and duration.

Concerning conditions for nuclear cooperation with China, the Administration's reply briefly refers to statutory conditions. Also, Ambassador Kennedy in hearings has reassured Congress that any agreement for nuclear cooperation reached with China would comply with U.S. statutes. It is understood that the State Department's negotiations have underscored this in their negotiations with the Chinese. The reply does not mention any special political, military or other concessions, in addition to those required by statute, to be required for cooperation with China. Nor does it indicate what specific conditions would be necessary for U.S. nuclear cooperation with the Soviet Union, or whether conditions for cooperation with the latter would go beyond those that the Administration intended to require of China.

Matters of possible interest to Congress not mentioned by the Administration include whether China would agree to:

(1) Require safeguards be applied to its nuclear exports as a condition for its nuclear cooperation;

(2) Require full-scope safeguards as a condition for its nuclear cooperation;

(3) Ratify the nuclear non-proliferation treaty; and

(4) Agree to the voluntary restrictions on nuclear cooperation laid down in the Nuclear Suppliers Guidelines.

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[5] For example, *Nucleonics Week* of December 15, 1983 reported the visit of a high-level delegation to Moscow from the French nuclear industry in November. At the request of the Soviet Union, French CEA officials presented a seminar describing the French nuclear program and the capabilities of French nuclear companies.

As for what the Soviet Union and China could do to bring about nuclear cooperation, from a U.S. point of view, they would have to meet the statutory requirements of the Atomic Energy Act of 1954 as amended, and probably some additional executive branch requirements. Notable among the latter probably would be agreement to require full-scope safeguards as a condition for their own nuclear exports, and for China to adopt the Nuclear Suppliers Guidelines. Also, international tensions between the United States and the Soviet Union and China would have to relax enough for the Administration and the Nuclear Regulatory Commission to routinely determine that various instances of nuclear cooperation would not be "inimical to the common defense and security." Finally, relations would have to improve enough for the COCOM restrictions to be lifted, which presumably would require consent of NATO nations and Japan.

Responding to the question about Soviet and Chinese policies on transfer of nuclear weapons, the Administration indicates that the Soviet Union appears to be conservative in its policies. As a party to the NPT, it is committed not to:

> . . . transfer to any recipient whatsoever nuclear weapons or other nuclear explosive devices or control over such weapons or explosive devices or control over such weapons or explosive devices directly, or indirectly; and not in any way to assist, encourage, or induce any non-nuclear weapons State to manufacture or otherwise acquire nuclear weapons or other nuclear explosive devices, or control over such weapons or explosive devices. (Article I)

Similarly, as an adherent to the Nuclear Suppliers Guidelines, the Soviet Union also is committed to exercise ". . . restraint in the transfer of sensitive facilities, technology and weapons-usable materials." In addition, the Soviet Union goes beyond U.S. policy by requiring the return of spent fuel from its satellites, thereby eliminating any prospects that these states might seize the spent fuel to recover its plutonium for weapons purposes. However, this policy does not apply to Soviet customers in the free world.

As for China, it has refused to join the NPT and has yet to adopt the Nuclear Suppliers Guidelines. It recently did join the International Atomic Energy Agency. While there is hope that China will be conservative in its conditions for nuclear cooperation and supply, the present Chinese policy appears unclear and some fear that China might supply sensitive unclear assistance to countries with an undue interest in nuclear weapons.

The proposition that less restrictive transfers of civil nuclear power technology might actually help to present further spread of nuclear weapons remains controversial in this year of the tenth anniversary of India's nuclear test. Bills and resolutions introduced in Congress during 1983 clearly favor more rather than less restriction on nuclear cooperation by the United States with other countries. On the other hand, Third World countries are likely to continue their objections to restrictions on their access to nuclear power technologies, particularly for countries that have taken the no-nuclear weapons pledge of the NPT, This is likely to come up at the third NPT review conference in 1985 and again at the U.N.'s Conference on Peaceful Uses of Nuclear Energy now expected in 1986.

Less restrictions might help with non-proliferation if such a policy were applied so as to give non-NPT states more reason to sign up and if it helped to assure that all nuclear power activities are carried on in full public view with no secret undertakings, such as Pakistan's enrichment and reprocessing efforts, or Argentina's recently announced enrichment work, or South Africa's secret enrichment efforts. On the other hand, less restrictions could make it easier for some states perhaps with military interest in nuclear weapons, to strengthen their industrial bases that might later be used to produce nuclear arsenals. Beneficial effects could well be small in comparison with those of events which might cause some non-nuclear weapons states to feel so threatened that they would decide nuclear weapons are necessary for their national security.

10. ARMS TRANSFERS*

1. Background

During the last decade, the United States has exported increasingly modern weapons and military equipment to Third World countries as well as to our major allies.

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*Prepared by Robert Shuey, Analyst, Foreign Affairs and National Defense Division.

Now many of this country's best defense systems are in the possession of foreign forces and are therefore more likely to be lost to the Soviet Union. American equipment and technical information may be lost to the Soviet Union in at least three ways: 1) through combat operations between a U.S. arms recipient and a country or revolutionary group that is willing to share information and captured equipment with the Soviet Union; 2) through the overthrow of a U.S. client or defection of military personnel and subsequent sharing of U.S. equipment and technology with the Soviet Union; or 3) through Soviet espionage operations.

If the Soviets acquire U.S. equipment, they may extract technology that will enable them to improve their own equipment, or they may develop the means to counter U.S. equipment. Even if the equipment and the technology are not lost to the Soviet Union, but merely exposed through combat operations, training manuevers, or routine security missions, local adversaries or Soviet personnel in the area may gather sufficient information to copy the systems or develop countermeasures. Coproduction arrangements with Third World countries pose a special threat to the security of U.S. defense production techniques as well as to U.S. equipment.

Conversely, Soviet arms, equipment, and technology sold abroad offer similar opportunities to the United States either directly or through friends and allies willing to share technological intelligence.

2. Commentary

The State Department reports that it is unaware of any case in which a foreign recipient of U.S. defense articles or technical data has deliberately passed those articles or data to the Soviet bloc. But Administration officials have acknowledged in interviews that Soviet bloc intelligence operations have clandestinely obtained some U.S. defense equipment from countries that had purchased the items from the United States.

Additionally, when South Vietnam was conquered by North Vietnam, a great deal of U.S.-made defense equipment fell to the Communists, and some of the equipment probably was given to the Soviet Union for intelligence exploitation. Some observers believe that when the Shah was deposed in Iran, the Soviet Union may have gained access to U.S. equipment and documents through reduced security in Iran or through diversion by anti-American elements there. Israeli military operations in the Middle East expose the capabilities and characteristics of some U.S.-made defense equipment to Syria, Iraq, the Palestine Liberation Organization, and probably to Soviet advisors and intelligence specialists.

The Central Intelligence Agency has reported that the Soviets have relatively easy access to U.S. and Western technology in Europe and that the Soviets have had success in acquiring such information. The Soviets have, according to this report, gained access to advanced technologies that are likely to be used by the West in future weapons systems.[1]

The Administration's response to question 2 (see sec. 10) describes the procedures used to protect against deliberate diversions to the Soviet Union of U.S.-supplied defense equipment and data. In earlier statements, the Administration has also expressed its concern about technology losses through arms sales and emphasized review procedures to protect against such losses. James L. Buckley, Under Secretary of State for Security Assistance, Science, and Technology, has said that:

> Requests for transfer of technologically sensitive materials will be considered on a case-by-case basis. Such transfer will not be approved if a significant possibility of compromise of sensitive information or equipment exists, or if justification on the basis of overriding U.S. interest cannot be made. We will also give serious consideration to future requests for co-production, or co-assembly, of military equipment produced by American manufacturers, while understanding the extreme complexity of this particular subject as well as the potential for conflict between foreign and domestic economic policy objectives.[2]

According to a directive by President Reagan:

> Those [requests] for co-production, or for the transfer of sensitive or advanced technology, will receive special scrutiny, taking into account economic and industrial factors for both the United States and other participating countries, the importance of arms cooperation with NATO and other close friends and allies,

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[1] U.S. Central Intelligence Agency. *Soviet Acquisition of Western Technology.* April 1982, pp. 11-13.

[2] U.S. Department of State. "Arms Transfers and the National Interest", *Current Policy No. 279.* May 21, 1981.

potential third party transfers, and the protection of sensitive technology and military capabilities.[3]

In response to the third question (see sec. 10), the Administration acknowledges that Soviet military sales are an excellent source of information on Soviet equipment for U.S. intelligence. The specific benefits gained by the U.S. military through this exposure of Soviet equipment are classified. Apparently, however, the Israeli Air Defense Force using such intelligence has learned how to operate U.S.-made aircraft successfully against Soviet-made aircraft and missiles. At least some of this information seems to have been given to the United States. Details on this and related matters are not available because information on U.S. and allied intelligence operations is classified.

11. CONTROLS AND SCIENTIFIC COMMUNICATION*

1. Background

With the arrival of the Reagan Administration, heightened concern about the acquisition of American technology by the Soviet Union and its Warsaw Pact allies prompted a policy of more vigorous enforcement of export administration laws and a tightening of restrictions on the communication of certain scientific information to foreign nationals, directly or indirectly, both within the United States and abroad. This effort at more stringent application of existing regulatory authority resulted in conflicts with and protests from the American scientific community with regard to limitations imposed on some presentations at international scientific conferences and attempts to prohibit certain visiting foreign students and scholars from attending some high technology courses or otherwise having access to selected high technological research projects being conducted by American universities.

During the initial years of the Reagan Administration, officials expressed concern about a variety of related developments:

Bilateral U.S.-U.S.S.R. agreements resulted in largely one-sided information exchanges favoring the Soviet Union and providing access to technological data in areas in which the Soviets are known to be deficient;

Scholarly exchanges were being misused by the Soviets who send senior, experienced, technical people, some of whom were from closed military research institutes;

A high volume of sensitive defense-related information was being disseminated by American scientists at professional conferences and symposia without awareness of or regard for attendees from Communist countries;

The U.S. authors of basic and applied research papers published in the open scientific literature were unaware of the implications their explicit explanations of purpose, professional affiliation, or research sponsorship may have for Soviet intelligence analysts.

Speaking as a panelist at the January 1982, annual meeting of the American Association for the Advancement of Science, C.I.A. Deputy Director Bobby R. Inman described the situation as a "hemorrhage of the country's technology." [*Washington Post*, Jan. 8, 1982, p. A1, A11. Remarks, see *Aviation Week and Space Technology*, vol. 116, Feb. 8, 1982, p. 10–11, 82.] He suggested that some type of government clearance arrangement, embracing not only pre-publication review of research reports, but also the initiation of research projects as well, was desirable for various areas of scientific study. Examples which he cited included computer hardware and software, electronic gear and techniques, lasers, crop projections, and manufacturing processes. Later that same month, a report by the Defense Science Board Task Force on University Responsiveness to National Security Requirements charged that, "(n)umerous advances in Soviet military weapon systems are directly traceable to technology transfers that occurred as a result of Soviet and Warsaw Pact student and scientist exchanges and their attendance at international scientific symposia held in the United States." [Report of the Defense Science Board Task Force on University Responsiveness to National Security Requirement, Jan. 1982, p. 4–7.] Accordingly, the Task Force report indicated that interpretation of International Traffic in Arms Regulations and Export Administration Regulations for university researchers "is required" and consistent guidelines limiting distribution of certain sensitive, non-classified scientific information was recommended. These controls would be written into all research contracts funded by the Department of Defense, some of

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[3] U.S. President. Text of President Ronald Reagan's, July 8, 1981, "Arms Transfer Policy Directive."

*Prepared by Harold Relyea, Specialist, Government Division.

those funded by other Federal departments, and would provide guidance in certain privately funded research contracts. Guidelines would be formulated "with the help of the universities" and were not to be "overly restrictive" or to "inhibit the legitimate flow of scientific information."

Such allegations and policy proposals created both confusion and concern among those to whom they potentially had application. An official Administration viewpoint on the need for and type of technology controls being contemplated did not emerge before the end of 1982.

It would appear, however, that various opportunities are available to the Administration to develop new national security controls for curbing undesired scientific and technical information flow and technology transfers to the Soviet Union. Testifying before two House Science and Technology subcommittees in March 1982, Admiral Inman had speculated that "6 months, a year, 18 months down the road, as the full magnitude of the Soviet's success of acquiring technology in the West comes to the front of the agenda to be considered by the Government, and the Government decides how to react, at that point I believe there will be proposals to try to regulate it." [U.S. Congress, House. Committee on Science and Technology, Impact of National Security Consideration on Science and Technology, Hearings 97th Congress, 2d session. Washington, U.S. Govt. Print. Off., 1982, p. 42.] As of early 1983, several Administration efforts having a potential for resulting in new technology transfer controls were underway. International Traffic in Arms Regulations were under revision at the Department of State; export regulations were under revision at the Department of Commerce; and the Secretary of Defense was preparing a formal report for Congress recommending improvements to his Department's technology transfer control policy. President Reagan had signed a National Security Study directive establishing an interagency group, chaired by the Office of Science and Technology Policy, to review the issue of protecting sensitive, but unclassified scientific research information. The panel was charged specifically with assessing the recommendations of a National Academy of Sciences report on scientific communication and national security which had been issued in September 1982. Committees in both Houses of Congress had begun hearings on legislation to renew the Export Administration Act due to expire at the end of September 1983. The Administration was developing its own proposals for presentation to these committees. [U.S. Congress, House. Export Administration Authorization: Communication from the President. H. Doc. 98-40, 98th Congress, 1st session. Washington, U.S. Govt. Print. Off., 1983.] An important, if not crucial, consideration for any new technology control policy is its impact on technological and scientific achievement in the U.S.

If "national security" is understood only in terms of Soviet military capabilities or defense considerations, attempts to control scientific information flow and technology transfer may succumb to a policy of general concealment. Such a policy could have serious consequences for scientific and technological progress in the United States and allied Western countries as well as free trade among the Western nations. Secrecy almost always impedes scientific and technological progress, if only because the scientific method and procedures for conducting scientific enterprise, whether basic or applied, rely upon an openly available body of pre-existing discoveries which guide research, criticism and validation of findings by colleagues, and improvement upon processes and results to advance knowledge. The scientific and technological achievements of a country contribute to the welfare and security of that nation. If "national security" is understood in military, economic, cultural, and psychological terms, then it may be argued, as many scientists do, that security results from achievement and not from concealment. The relatively unfettered communication of scientific and technological information contributes to more productive scientific and technological enterprise, i.e., rapidly developing and superior scientific achievements, better scientific research and education, and a greater number and variety of contributions to the nation's domestic welfare and economy, defense needs, and overseas trade position.

The Reagan Administration has taken some steps to move beyond a narrow understanding of "national security" and to consider the potential disadvantages to scientific and technological enterprise, achievement, and free trade implicit in applying more restrictive controls to scientific and technological communication and technology transfers. The primary effort in this regard has been one of facilitating dialogue on this policy matter. Administration officials have appeared before Congressional committees to discuss concerns about Soviet acquisition of American technology and ways of stemming this flow; some have participated in roundtable discussions and panels initiated by scientific and engineering professional organizations to explore these issues. In February 1982, a DOD-University Forum, composed of eight university presidents, the leaders of three education organizations, and nine

members representing the Department of Defense, began a series of ongoing meetings to discuss technology transfer and export controls, research support for universities, graduate education in the physical sciences, and other matters of mutual interest to the Department and the academic community. Co-chaired by Dr. Donald Kennedy, president of Stanford University, and Dr. Richard Delauer, Under Secretary of Defense for Research and Engineering, the Forum was established in response to a recommendation of the Defense Science Board Task Force on University Responsiveness to National Security Requirements. [Rept. of the Defense Science Board Task Force on University Responsiveness to National Security Requirements, p. 6–12.] The following month, the National Academy of Sciences announced the creation of a study panel on scientific communication and national security. This group was funded in part by the Department of Defense, and various Federal officials having responsibilities for national security and export controls worked closely with it. The panel produced its final report in September 1982. Three months later, President Reagan directed the creation of an interagency group, chaired by the Office of Science and Technology Policy (OSTP), to review the issue of protecting sensitive, but unclassified scientific research information and to assess the specific recommendations of the National Academy study panel.

The Administration's dialogue efforts, however, have not escaped criticism. Comments have been made that, although Administration officials testify before Congressional committees and participate in scientific and engineering professional organization sessions to discuss new restrictions on scientific communication and technology transfers, they do not always appear to have heard the criticisms voiced against their positions. Some fear that, through the DOD-university Forum, the Department of Defense may be bargaining for university acceptance of new national security controls on scientific and technological communication in exchange for much needed support funds. There is concern, as well, that the OSTP interagency committee assessing the recommendations of the National Academy of Sciences study panel may formulate a directive on scientific communication restriction for the President's signature without providing the scientific community an opportunity to comment on it. When a new and more restrictive executive order on security classification policy and procedure was developed for the President during the spring of 1982, no opportunity for public comment was provided before it was transmitted to the White House. When the predecessor order was formulated in 1978, the Carter Administration had welcomed public comments on the draft.

In April 1982, President Reagan signed E.O. 12356, a new executive order prescribing revised security classification policy and procedure. The latest in a series of such directives which first appeared in 1940, the Reagan order replaced E.O. 12065 issued by President Carter in July 1978. Effective as of August 1982, the new executive order appeared to reverse a trend of the past thirty years toward narrowing the bases and discretion for assigning official secrecy to government records. E.O. 12356 generally expands the categories of classifiable information, mandates that information falling within these categories is to be classified, makes reclassification authority available, admonishes classifiers to err on the side of classification, and eliminates automatic declassification arrangements. The general results of these policy changes are likely to be more classification, less declassification, and the longer duration of official secrecy. The consequences of these developments, in turn, seemingly will be much greater administrative expense to the government and an amplification of all of the practical problems associated with the maintenance and use of officially secret documents.

E.O. 12356 also has particular implications for government restriction of scientific and technological communication. Because of its emphasis on vigorous classification efforts and both the increased number and breadth of its classification categories, the new order may prompt frequent widespread application of official secrecy to scientific research produced by and for the Federal Government. Among the categories of information which "shall be considered for classification" under the order are "scientific, technological, or economic matters relating to the national security," which was included in the predecessor directive, and two new fields—the less specific area of "vulnerabilities or capabilities of systems, installations, projects, or plans relating to the national security" and the more specific subject "cryptology." In addition, for the first time, E.O. 12356 warns "contractors, licensees, and grantees" that they shall be subject to appropriate sanctions for improperly handling classified information. As grantees, more scientists may find their government-funded studies being classified and discussion about them foreclosed to all but those who are properly approved to receive such protected information and have a "need to know" about the particular research in question. Access to classified information is predicated on meeting both of these requirements.

As was the case with the predecessor order, E.O. 12356 stipulates that "(b)asic scientific research information not clearly related to the national security may not be classified." However, not only are applied scientific research data and technological information outside of this limitation, but the distinction between basic and applied research in some areas, such as biotechnology, is not clear.

A general implementation directive for E.O. 12356 was issued by the Information Security Oversight Office of the General Services Administration in June 1982. [*Federal Register*, v. 47, June 25, 1982, pp. 27836–27842.] Agency regulations implementing the new order are in the process of being finalized and published in the *Federal Register*.

The Export Administration Act of 1979 directs the Secretary of Commerce, in conjunction with the Secretary of Defense and other appropriate departments and agencies, to develop a list of "militarily critical technologies" (50 U.S.C. App. 2404(d)). Originally recommended by a 1976 report of the Defense Science Board Task Force on Export of U.S. Technology, the Militarily Critical Technologies List (MCTL) is a detailed and structured technical statement of development, design, production, and utilization technology which the Department of Defense considers to be critical to a given military capability and of significant value to potential adversaries. In October 1981, the table of contents for both a draft MCTL and a list of energy related militarily critical technologies, which was developed by the Department of Energy, were published in the *Federal Register*. [*Ibid.*, v. 45, October 1, 1980, pp. 65014–65019, 65152–65167.] Detailed specification and supporting documentation for the MCTL are still undergoing security review. Reportedly some 700 pages long, the MCTL is a classified document.

Although the U.S. business community appears to support the MCTL concept, the current draft list has been criticized for being overly broad and too long. Speaking at a June 1982 round-table on "Managing the Flow of Technical Information" sponsored by IEEE Spectrum magazine, the vice chairman of Control Data Corporation, for example, described the MCTL as "an exercise in futility" and added: "In an analysis that my company has made of the list only 125 of its 700 technologies were found to be possible candidates for restrictive exporting and in many cases the restriction would have protected a proprietary process of particular companies rather than a technology that had any military significance." Concluding that "(t)he prime result of the MCTL is a loss of business by U.S. companies seeking to engage in free trade," he suggested that "in an effort to protect our truly advanced technology the MCTL should be revised and it should be shortened instead of broadened. [The Institute of Electrical and Electronics Engineers. Managing the Flow of Technical Information—An Industry/Govermnent Dialogue June 2, 1982. IEEE Service Center, 1982 p. 10–11.]

The September 1982 report of the National Academy of Sciences, *Scientific Communication and National Security*, foresaw "a real danger that the pending MCTL, if applied to scientific communications, will serve to make the export control effort more diffuse rather than to help the government focus on the most critical areas of concern." Concluding that the MCTL was overly broad and "too unwieldy to be useful in guiding government controls of scientific and technical communication," the report recommended "a drastic streamlining of the MCTL by reducing its overall size to concentrate on technologies that are truly critical to national security." In addition, the report urged the removal of items from the MCTL if they were in one or more of four specified categories of scientific information and recommended that, when technology transfer controls are established for reasons other than direct military applicability, mechanisms other than the MCTL approach should be used.

Effective efforts to prevent the inadvertent transfer of export controlled U.S. high technology to the Soviet Union by businesses in Western Europe or Japan appear to depend upon four important elements. The first of these is clear policy on use requirements: Western industries receiving export controlled U.S. high technology should be specifically required to abide by U.S. restrictions on the transfer of such technology to particular foreign interests. The second ingredient is intelligence: the United States and its Western allies must actively seek to ferret out and identify trading companies and other business entities which are covert instrumentalities of the Soviet Union seeking to deceive unsuspecting Western entrepreneurs in order to obtain export controlled U.S. high technology. The third element is education: mechanisms must be established and maintained for purposes of informing U.S. exporters and Western businesses about covert instrumentalities of the Soviet Union which operate outside of the Communist bloc as conduits for export controlled technology. Finally, there must be arrangments to facilitate cooperation between the United States and its Western allies regarding the intelligence and education functions noted above as well as the enforcement of use requirements: since 1950 the Coordi-

nating Committee for Multilateral Export Controls (COCOM) has provided one such cooperative arrangements and it appears that additional bases of joint action in the area of export control will result from the Ottawa Summit of 1981 and the North Atlantic Treaty Organization (NATO).

2. Commentary

On the general question of increased Governmental regulation of technical data flow, executive branch written responses indicated it was difficult "to predict what the impact of new national security controls would be given the number of options being discussed and uncertainly about their scope." Assurance was given that the Administration was aware of the concerns of scientists regarding new national security controls "and sensitive to the importance of free and open scientific communication among all scientists everywhere and of a free and open university system." But the record on this point is not clear. In mid-May, for example, when the House Committee on Foreign Affairs began its mark-up of legislation (H.R. 2971, modified and reintroduced as H.R. 3231) to revise and extend the Export Administration Act, an amendment to the policy section of the statute was offered by Rep. Lee Hamilton and was adopted with bipartisan support within the Committee. The new provision, which was to remain in the House-passed version of the legislation, declared the following:

> It is the policy of the United States to sustain vigorous scientific enterprise. To do so requires protecting the ability of scientists and other scholars freely to communicate their research findings by means of publication, teaching, conferences, and other forms of scholarly exchange.

When asked for his views on the proposed amendment by the Committee chairman, Lawrence Brady, Assistant Secretary of Commerce for Trade Administration, offered testimony in opposition to the provision.[1]

Executive branch written responses also indicated that the report of the National Academy of Sciences, *Scientific Communication and National Security*,[2] "is a good starting point in answering the question and in deciding what various new security controls, if any, should be adopted." It was noted that "the Administration has expressed its intent to carefully review the report and its recommendations." Indeed, on December 12, 1982, President Reagan issued National Security Study Directive 14-82 establishing an interagency group to "review the issue of protecting sensitive, but unclassified scientific research information, taking into account the recommendations made by the National Academy of Sciences' Panel on Scientific Communication and National Security. . . ." The objective of the review was to facilitate the production of a National Security Decision Directive, and the interagency group was to prepare a report by March 1, 1983, for consideration by the National Security Council. In February, the mission of the interagency group was made part of a broader White House study of export controls and the panel's report deadline was extended to sometime in the late autumn of 1983.[3] By the end of the year, there was no indication that the interagency group had prepared a report and efforts toward this end appeared to be stalled. This situation prompted concern within the scientific community that the Administration was not proceeding expeditiously and was ignoring the National Academy report.

Perhaps a more successful effort at dialogue has resulted from the experience of the Department of Defense-University Forum. In January 1982, a Defense Science Board task force report recommended creation of "a forum to allow periodic consultations between senior university representatives and DOD officials on the full range of research-related needs and issues that affect the Department's ties with universities."[4] Co-chaired by the Under Secretary of Defense for Research and Engineering and the president of Stanford University, the panel, composed of eight university presidents, the heads of three education organizations, and nine members representing DOD, was formed and began meeting in February. Among the topics on its agenda have been technology transfer and export controls, research support for universities, graduate education in the physical sciences and engineering, the universities' needs for new laboratory instruments, and the Nation's needs for more

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[1] U.S. Congress. House. Committee on Foreign Affairs. Unpublished transcript of May 18, 1983 mark-up. Hearing, 98th Congress, 1st session. Washington, D.C.

[2] National Academy of Sciences. Panel on Scientific Communication and National Security. *Scientific Communication and National Security*. Washington, National Academy Press, 1982.

[3] Colin Norman. "Musical Chairs at OSTP." *Science*, v. 220, June 17, 1983, p. 1255.

[4] U.S. Department of Defense. Office of the Under Secretary of Defense for Research and Engineering. Report of the Defense Science Board Task Force on University Responsiveness to National Security Requirements. Washington, D.C., January, 1982, p. 6-20.

students trained to know foreign languages and function as experts on other countries.[5] Unfortunately, the DOD-University Forum is not regarded to be a Government advisory committee and its proceedings, therefore, are not subject to the open access requirements of the Federal Advisory Committee Act or Freedom of Information Act. Nonetheless, it has provided an opportunity for DOD officials to hear firsthand certain of the concerns of university administrators and education groups regarding increased national security controls on scientific communication.

By the time of the dialogue session, new national security controls on technical data flow, and otherwise affecting scientific communication, were more visible than they had been at the time written departmental responses to dialogue questions were prepared. Promulgated in April of 1982 to become effective in August, E.O. 12356, with its broadened criteria for classifying information, became fully operational.[6] More vigorous and stringent enforcement of existing export regulatory authority, begun in 1982 with Operation Exodus, continued. In early May 1983, William Schneider, Jr., Under Secretary of State for Security Assistance, Science and Technology, released a statement indicating, in part, that "the State and Justice Departments have been directed to apply the appropriate provisions of the Immigration and Nationality Act to deny or restrict visas when there is reason to believe that an alien is seeking to come to the United States to acquire controlled strategic technology illegally." Furthermore, it declared that "this policy is now in effect, and we are taking the steps necessary to implement it."[7] In mid-May, President Reagan issued National Security Decision Directive 84 requiring, among other things, that Federal employees and contractors having access to classified information sign a nondisclosure agreement and, if using sensitive compartmented intelligence information in their work, commit themselves to prepublication review of unofficial writing.

When signed into law in September, the Department of Defense Authorization Act for 1984 contained a provision empowering the Secretary of Defense to "withhold from public disclosure any technical data with military or space application in the possession of, or under the control of, the Department of Defense, if such data may not be exported lawfully outside of the United States without an approval, authorization, or license under the Export Administration Act . . . or the Arms Export Control Act."[8] The Administration had made its wishes known for strengthening its regulatory power pursuant to the Export Administration Act.[9] An Administration-supported bill (S. 774) to amend the Freedom of Information Act, reported by the Judiciary Committee during the 98th Congress, contained a provision allowing the withholding of "technical data that may not be lawfully exported outside the United States without an approval, authorization, or license under Federal export laws." The Department of Defense reportedly was considering an elaborate new control system for a category of sensitive technical information that would be identified through a Militarily Significant Emerging Technologies Awareness List (METAL) and would be regulated through a combination of proprietary and export authority.[10] And, as noted earlier, the possibility existed that the National Security Council would soon perfect a comprehensive National Security Decision Directive on the protection of sensitive, but unclassified, scientific information.

At the dialogue session, executive branch participants were asked to elaborate on how so-called sensitive technology could be identified; how it could be secured, particularly if it could not properly be classified; and how so-called national security controls could be perfected and applied so as not to restrict the scientific progress and achievement that had been possible under traditional open procedures.

In remarks preliminary to discussing the questions posed, executive branch representatives noted that the Federal Government has sufficient technological and intelligence resources to determine what constitutes sensitive technology in the context of Soviet desires and East-West trade. Expertise within the Central Intelligence

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[5] Gina Kolata. "DOD and University Presidents to Meet." *Science*, v. 215, February 26, 1982, p. 1080–1081.

[6] See *Federal Register*, v. 47, April 6, 1982, p. 14874–14884.

[7] U.S. Department of State. Press statement (William Schneider, Jr.). Washington, D.C., May 5, 1983, p. 3.

[8] 97 Stat. 614, 690.

[9] See U.S. Congress. House. Export Administration Authorization: Communication from the President of the United States Transmitting a Draft of Proposed Legislation to Amend and Reauthorize the Export Administration Act of 1979. H. Doc. 98–40, 98th Congress, 1st session. Washington, U.S. Govt. Print. Off., 1983.

[10] See Richard Barnard. "Pentagon Mulls New Technology Secrets List". *Defense Week*, v. 4, October 17, 1983, p. 1, 5; Richard Barnard. "Pentagon Weighs New Strictures on Unclassified Papers". *Defense Week*, v. 4, October 24, 1983, p. 1, 10–11.

Agency [11] and the Department of Defense [12] was mentioned in this regard. In a policy context, the sensitivity of certain technologies could be made known, it was believed, by placing them on an identification list, such as the Commodity Control List, the Militarily Critical Technologies List, or the recently proposed Militarily Significant Emerging Technologies Awareness List. Ultimately, it was explained, the United States would seek to have the technologies placed on its own lists included as well on the control list maintained by the Coordinating Committee for Multilateral Export Controls (CoCom). There are three CoCom lists, one for military items and technologies, another for atomic energy purposes, and a third covering commodities and technologies which can have both miltiary and civilian applications. CoCom is presently engaged in a major review of these lists to ensure that they reflect current strategic concerns. Such reviews are conducted about every three years.

A staff member of the House Committee on Foreign Affairs, who participated in the dialogue session, reminded the executive branch participants that Congress had not sanctioned the security classification of the Militarily Critical Technologies List (MCTL) and noted industry complaints that the MCTL was overly broad in scope. Departmental representatives responded by saying that an openly available MCTL would allow the Soviet Union and its satellites to more easily target the technologies they wanted, which would endanger U.S. national security. They noted, as well, that the MCTL has been periodically revised since its initial issuance in October 1980. They also acknowledged that the MCTL had not been maintained as an integral part of the Commodity Control List: some items on the MCTL were not included on the CCL. But, they added, CoCom members were very supportive of the list approach to controlling sensitive technologies. Apart from this discussion, it had been disclosed recently that an internal DOD report recommending the creation of a Military Significant Emerging Technologies Awareness List and related regulatory system had commented that Congressional and other demands for reducing the size of the MCTL could be realized simply by transferring categories of information to the proposed METAL.[13]

With regard to securing sensitive scientific and technical data that cannot properly be classified, executive branch participants emphasized the need for obtaining the cooperation of research scientists and industry in this regard, the "skillful" application of controls mandated by the Export Administration Regulations and International Traffic in Arms Regulations, and the development of improved technology transfer controls and their enforcement through CoCom. A State Department representative commented that, with regard to East-West trade, technical data controls on unclassifiable technology would be more stringent in the case of the Soviet Union and its Warsaw Pact allies due to both foreign policy considerations and the industrial capabilities of those nations. By contrast, he indicated that such controls might be less restrictive in the case of the People's Republic of China because it is viewed as being a less-industrially sophisticated "emerging nation."

Principal representatives from the State Department indicated that officials within their organization who were responsible for regulating technical data flow were aware of the effect that stringent restrictions on scientific communication could have on scientific achievement and progress. They also agreed that scientific and technological advancement was important for the security of the United States. These views were generally supported by a Commerce Department representative. However, no further discussion of these matters ensued due to time constraints. This consideration, that national security controls on scientific communication would impede scientific and technological development, is crucial, of course, to scientists and engineers. Moreover, it appears that officials within certain quarters of the Department of Defense have been the most vigorous supporters and proponents of increased national security controls on scientific communication.

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[11] See U.S. Congress. Senate. Committee on Governmental Affairs. Transfer of United States High Technology to the Soviet Union and Soviet Bloc Nations. Hearings, 97th Congress, 2d session. Washington, U.S. Govt. Print. Off., 1982, p. 236–237.

[12] See Paul Mann. "New Center to Oversee Export Licenses". *Aviation Week & Space Technology*, v. 119, September 19, 1983, p. 71–74.

[13] Richard Barnard, "Pentagon Mulls New Technology Secrets List". *Defense Week*, v. 4, October 17, 1983, p. 5.

12. AMERICAN-SOVIET SCIENCE AND TECHNOLOGY AGREEMENTS*

1. Background

Unofficial scientific exchanges between the United States and the Soviet Union began in 1955 when a governmental cultural exchange agreement was signed that provided for general student and personnel exchanges including those in science and technology. Following the launch of Sputnik in 1957, a scientific exchange agreement for cooperation was signed, in 1959, by the U.S. National Academy of Sciences and the academies of the Soviet Union and East European countries. However, formal intergovernmental scientific cooperation did not begin until 1972 following the Nixon-Brezhnev Moscow meeting. During the period 1972 to 1974, the two countries signed 11 bilateral cooperative agreements in science and technology to promote joint scientific research in both pure and applied science.

Some observers have suggested that the agreements were intended specifically to foster Soviet access to U.S. applied science and technology development in which the Soviets were lagging. Assessments of the reciprocity of activities suggest that while the Soviets have tended to benefit from technology transfer, the United States has tended to derive benefit from access to science at the theoretical level. *(Key Issues in U.S.-U.S.S.R. Scientific Exchanges and Technology Transfer*, p. 5.)

The main agreement, signed in 1972, which served as a model for the other agreements, was the Agreement on Cooperation in the Fields of Science and Technology. A joint commission composed of scientists and policymakers from both countries, chaired on the U.S. side by the Director of the Office of Science and Technology Policy, was established to determine priorities for cooperation. The National Science Foundation was charged with managing most of the programs under the agreement (including chemical catalysis, electrometallurgy and materials, microbiology, physics, computer applications to management, science policy, and scientific and technical information). The other agreements signed during 1972 to 1974 dealt with energy, atomic energy, space, public health and artificial heart research, housing, transportation, environmental protection, the world oceans, and agriculture. These are managed by Federal agencies with reponsibility in these areas.

Many of the activities authorized in those years have been terminated or curtailed primarily for reasons of national security and foreign policy. Details are as follows: In December 1979, as a result of U.S. reaction to the Soviet invasion of Afghanistan, President Jimmy Carter instructed that only low-level exchange activities be continued. No planning meetings or exchange activities were to be conducted between high-level scientists. In some cases funding and operations were cut 75 percent from the level preceding the Afghanistan invasion. (Funding to carry out activities under each of the 11 agreements came from the agency that conducted the activity. There is no centralized budget for activities conducted under the agreements.)

Each of the 11 bilateral agreements for cooperation has to be renewed every 5 years. Despite the fact that, in late 1979, activities were limited to only low-level exchanges, three agreements that were due to expire in late 1981 were renewed. They were the agreements for cooperation dealing with the oceans, the environment, and public health. However, on December 29, 1981, President Ronald Reagan imposed additional sanctions on the Soviet Union following the imposition of martial law in Poland. Subsequently, the United States did not renew the agreements on space, energy, and science and technology, which were to expire in May, June, and July 1982. The President also ordered a classified National Security Council review of the status of the remaining eight agreements. The two agreements that were due to expire, in June 1983, deal with agriculture and atomic energy. Each was renewed.

In addition, activities have been cut to about one-half the pre-Afghanistan invasion level under the National Academy of Sciences programs, since the bulk of funding comes from the Federal Government and Academy members object to Soviet human rights violations.

The Administration's general view is that scientific exchanges and the transfer of technical information to the Soviet Union should be curtailed for political reasons and because they pose a threat to military and national security. However, according to some experts, this decision poses a dilemma for U.S. policymakers since the Soviet system is closed and it has been estimated that about 90 percent of the science and technology information the United States receives from the Soviets occurs via official exchange agreements.

*Prepared by Genevieve Knezo, Specialist, Science Policy Research Division.

Arguments in support of curtailing scientific exchange activities generally contend that Soviet science, technology, and economic growth will suffer from being cut off from the United States; that activities under the agreements were never reciprocal to begin with; and that unacceptable Soviet political behavior warrants such sanctions. Arguments against the cutbacks are that some areas of American science have been advanced because of communication with the Soviets, and that cutbacks will hurt American science; the United States, by virtue of cutbacks, has lost political influence on and access to Soviet scientists; and that such cutbacks facilitate Soviet persecution of their own scientists, since the pressure of outside observation has been mitigated. The argument is also made that a modicum of scientific and technical cooperation should remain, since it may serve as a base upon which to expand future cooperative activities, should rapproachement occur between the United States and the Soviet Union.

2. Commentary

The Administration's response to the questions posed by the Joint Economic Committee indicated that curtailment of scientific and technological exchange activities with the Soviet Union constituted one of the punishments levied against the Soviets for incursions into Poland and Afghanistan. Exchange activities were reduced 75 percent and several agreements were allowed to lapse: science and technology; energy; and space. Other agreements which are now in force or were renewed since 1979 are in health; artificial hearts; environmental quality, oceans; medicine and public health; agriculture; transportation; and atomic energy. Only a low level of activities (approximately 20 percent of the original level) was allowed to continue under the auspices of the renewed agreements, just enough, according to the Administration, to maintain a framework of cooperation. Sanctions are expected to remain in force until Soviet behavior changes.

Subsequent to the preparation of this response to the Joint Economic Committee, the Administration, in the summer of 1983, resumed negotiations with the Soviets to renew the general agreement on academic, scientific and cultural exchanges. However, following the Soviet attack on a Korean passenger jetliner in the fall of 1983, the United States suspended these negotiations. (Walsh, Oct. 21, 1983.) In response to this move, the Soviets, ostensibly concerned about the physical security of their nationals, withdrew 20 Soviet scientists and scholars who had just arrived in the United States on September 5 to spend the academic year at U.S. universities. (U.S.-U.S.S.R. Relations: Soviets Recall Scientists, Citing Risk.)

Several important issues were not addressed completely in the dialogue, including the implications of the political significance of cooperation, the criteria for selecting activities to be curtailed, and assessment of the benefits and costs of curtailing cooperative activities. Politics has always formed the foundation of scientific and technological cooperation with the Soviet Union. The first agreement for cooperation in science and technology was signed following the beginning of detente with the Soviet Union, in 1972, and the scientific programs have always been an important component of the cooperative political relationship with the Soviet Union. However, one could ask, why are the science and technology programs more salient politically than technology transfer and trade? The United States has lifted some of the technology transfer and trade sanctions placed on the Soviet Union following the Polish crisis. Why haven't more of the scientific and technological exchange activities been renewed?

Undersecretary for Security Assistance, Science, and Technology William Schneider, Jr., enunciated U.S. policy governing exchanges on August 2, 1983:

> We are currently proceeding with activities of particular benefit to the United States especially in the areas of health, environmental protection, and safety. We have maintained the structure of scientific cooperation intact in most areas so that beneficial exchanges could be expanded if the political situation should warrant.

He continued by saying that the primary criterion for the selection of those agreements which have been terminated was their expiration date, which in all cases was mid-1982. The concern felt by this Administration, he said, about possible technology loss through these cooperative agreements was in the background of his decision, but it was not a controlling factor. (See Norman, *Common Sense in U.S.-Soviet Trade*, U.S. Technology Transfer Controls "Ineffective," and Weinrod and Pilon.)

The Administration noted that a classified review of the bilaterals with the Soviet Union was conducted in 1982 for the National Security Council and that this review has served to guide policy. It seems evident that Congressional understanding of the

basis of policy formulation in this area would be enhanced if the rationale embodied in this document were publicly discussed.

One might ask, for example, is the United States losing more than it is gaining by having terminated the bulk of scientific and technological cooperation with the Soviet Union. The Agreement for Cooperation in Science and Technology was terminated even though it was cited in a report to Congress as having generated considerably useful exchange. (Report to Congress on Scientific Exchange Activities with the Soviet Union, Fiscal Year 1981 and Fiscal year 1982, as required by the Department of State Authorization Act (Sec. 126. (a)(b).) In addition, information appended to the Administration's response and anecdotal information presented elsewhere have described some of the program's benefits to U.S. science. According to a report in *Science News,* National Academy of Sciences President Frank Press is reported to have said:

"[T]here are a sufficient number of fields where the Soviets operate at world level capability . . . that we really would be damaging ourselves by not having these kinds of contacts." The fields, Press said, where the Soviets are on at least equal footing with the rest of the world include: high energy physics, magnetohydrodynamic transformation of energy . . . theoretical physics, astrophysics, materials for fusion (including lasers) condensed matter physics, astrophysics, materials for fusion (including lasers), condensed matter physics, and cosmology. (Greenberg, April 2, 1983.)

According to some Soviet scientists, the course of both American and Soviet science will suffer in several areas without joint research. They have cited such fields as "theoretical and experimental research into the mechanisms of organic and metallorganic compounds, a study of new types of chemical bonds and a search for renewable sources of raw materials and energy. . . ." (Greenberg, Apr. 2, 1983.) Other Soviet scientists have cited mutually beneficial work in magnetohydrodynamics and work with cationoid reagents.

The United States appears to have accrued other benefits from exchange activities with the Soviet Union. These consist primarily of obtaining information about scientific activities and influencing public opinion. The Undersecretary of State for Security Assistance, Science, and Technology explained some of these in recent testimony:

> In general, the cooperative scientific and technological exchanges provide the United States with information on the overall capabilities of Soviet science, some Soviet-to-United States technology transfer in fields where their domestic capabilities are more advanced than ours, and in improved knowledge and understanding among our own scientific institutions not only of Soviet science but also of the U.S.S.R.'s internal and foreign policies. Furthermore, our bilateral activities provide access to an influential layer of modern Soviet society—the scientific sector—which is often receptive to our efforts at explaining American views. (Overview of International Science and Technology Policy, 1983.)

There have also been statements to the effect that "If the Korean tragedy did anything, it demonstrated the current inability of either side to understand the other." As a result, some observers believe that exchange activities with the Soviets should be resumed to enable us to understand Soviet motives and behavior. (Scully.)

Public discussion of the criteria used to cancel or continue agreements as well as of the criteria used to analyze the benefits and costs of U.S.—Soviet scientific cooperation might generate better understanding about how the United States intends to improve the cooperative programs if they are resumed on a full-scale basis. There have been complaints from both scientists and politicians that the activities conducted under the exchanges were imbalanced, with Soviet science gaining far more from the exchanges than American science. There also have been charges that the Soviets allow only political operatives, not the best scientists, to attend professional meetings and participate in some of the exchange activities. However, the Administration's response indicated that, to some extent, U.S. science benefitted from exchanges with the Soviet Union. But it did not detail precisely the balance in reciprocal activities that were conducted nor its plans to ensure reciprocity if the activities were to be resumed completely. Since it is likely that scientific exchange activities might be renewed sometime in the future, it would be useful to policymakers and the public if the United States specified more clearly the criteria it would use to ensure reciprocity in scientific and technological activities with the Soviet Union. Such an assessment might also clarify the political realities of an important part of international cooperative science.

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13. AMERICAN-CHINESE TECHNOLOGY TRANSFER*

1. Background

In comparison with most of the Eastern European and other Communist countries, the Reagan Administration appears to be giving preferential treatment to the People's Republic of China with regard to liberalizing policies for technology transfer. In the summer of 1983 China was placed in country group V for purposes of export licensing.[1] However, prior to then, the early enthusiasm for expansion of

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[1] Until the summer of 1983 the United States had placed China in the more restrictive country groups of P or Y which did not permit the issuance of export licenses for sales of all the dual-use and military technologies which may now be sold to China by virtue of its inclusion in country group V.

trade with China had been reappraised and, in some areas, subject to cutbacks. This restrictive attitude also appears to have circumscribed the substance and type of activities conducted under the bilateral science and technology agreements between the United States and the People's Republic of China. Moreover, for all intents and purposes the United States had not formally acknowledged that it had adopted liberalized trade and technology transfer policies with the People's Republic of China. As a result, there were inconsistencies between enunciated policy and observable actions. It is no surprise, then, that both Chinese and American public and private decisionmakers, at times, appeared confused about U.S. policy objectives. It might be to the advantage of the United States to clarify the short- and long-term policy objectives with the People's Republic of China in order to develop consistent technology transfer policies.

There seem to be several advantages to a vigorous policy of trade and technology transfer: (1) the short-term benefits of increased markets and profit margins, and (2) the long-term benefits of: (a) better strategic accord between the United States and the People's Republic of China, (b) strengthening of Chinese cultural affinity for the West, (c) fulfillment of the moral and humanitarian imperatives of developing a less-developed country, and (d) ensuring U.S. access to vast supplies of natural resources.

There are also disadvantages to such a policy, including: (1) the irreversibility of technological transfer and technological progress if political alignments change, and (2) the view that approaching technological parity may lead to U.S. disadvantages in the political, technological, and economic sectors as evidenced by the cases of U.S. aid and technology transfer to Japan and South Korea.

Questions remain about the clarity and consistency of U.S. objectives in its short- and long-term policies for technology transfer with the People's Republic of China. Several analysts have said that security considerations might suggest that, to the extent that the United States is uncertain about its objectives, the extent of technology transfers should be curtailed. A more liberal interpretation would call for a clarification of technology transfer policies with the People's Republic of China with regard to their individual and specific economic, political and security-military implications. (Suttmeier, Fingar.)

2. Commentary

U.S. policy for technology transfer and trade with the People's Republic of China (P.R.C.) departs sharply from the past, since it decouples China policy from policy for the Soviet Union. The Administration's response indicates that its goal is to "normalize and liberalize relations" with the People's Republic of China. Furthermore, according to the Administration, it is in the strategic interest of the United States to aid the People's Republic of China.

The response described the evolution of a progressively more liberalized U.S.-P.R.C. technology transfer policy. China had been given most-favored-nation (MFN) tariff status in February 1980 following ratification of the U.S.-China Trade Agreement. However, China was still considered a member of country group Y for purposes of export licensing. Sales of most dual-use items were prohibited, as they were for the Soviet Union and East European countries, which were also members of country group Y. In April 1980, concomitant with attempts to liberalize trade, China was placed in country group P status, resulting in issuance of a new, even more liberalized, licensing policy, which was announced in June 1981. It allowed exports at twice the technical levels permitted before, including some dual-use items. Implementing guidelines for the new policy were announced in December of 1981. (See the Administration's response for details.) In practice, however, according to testimony of William T. Archey, Deputy Assistant Secretary of Commerce for Trade Administration, before the Subcommittee on International Economic Policy and Trade of the House Committee on Foreign Affairs, November 17, 1983, U.S. export controls were not, in practice, as liberal as the President's announced new policies.

Following a Commerce Department study of the issue, the current trade policy with China was announced. This occurred in the summer of 1983, after completion of the Administration's response to the Joint Economic Committee. The Administration placed China within the V group of countries for purposes of export licensing. Implementing guidelines were issued on November 23, 1983. China is now categorized as a "friendly, nonallied country." U.S. export licenses are to be issued for trade with China basically for all goods, including military weapons, except if there is "clear evidence of damage to U.S. national security." The previous P status permitted the issuance of licenses except if there was a "risk to national security." (*Inside the Administration,* Oct. 7, 1983.) As a "friendly nonallied country" China is

to be treated like Switzerland or Brazil for purposes of export licensing. According to the testimony of William T. Archey on November 17, cited above, the technical implementing guidelines govern "exports to China in seven areas considered most important to China's modernization program. . . . These are: (1) computers; (2) computerized instruments; (3) microcircuits; (4) electronic instruments; (5) recording equipment; (6) semiconductor production equipment; and (7) oscilloscopes."

The Commerce Department uses definitions of three technology zones to guide licensing decisions. They are:

> Green zone, license applications within this zone will receive, for the most part, expeditious consideration and approval without interagency review (75 percent of license applications will fall here);
>
> Intermediate zone, for very high technology and will require case-by-case review by DOD and other agencies; licenses will be approved unless there is a clear threat to U.S. national security; and
>
> Red zone, the most advanced technologies which would have direct applications to advanced military systems. (Archey, p. 5–7.) "Of particular concern," the guidelines say,
>
> > Are exports that would make a direct and significant contribution to nuclear weapons and their delivery systems, electronic and anti-submarine warfare, intelligence gathering, power projection and air superiority. Licenses may be approved even when the end-user or end use [is] military. Commodities or data may be approved for export even though they may contribute to Chinese military development. (People's Republic of China; Export Control Policy; Placement in Country Group V.)

Many U.S. scholars and politicians alike urged adoption of such a liberalized technology transfer and trade policy with the People's Republic of China as in the best long-term interests of the United States. See, for example, the Atlantic Council's policy paper on *China Policy for the Next Decade,* 1983. U.S. policy was liberalized to help achieve U.S. political, i.e., strategic, objectives, as well as to open up markets for U.S. products, as urged by many segments of U.S. industry. Symbolic affirmation of the new direction of U.S. policy was reflected in the visits of Commerce Secretary Baldrige and Defense Secretary Weinberger to China in the summer of 1983.

Despite the issuance of this policy, several fundamental political and security issues appear to remain unresolved regarding U.S.-China technology transfer policy. Most of these were not discussed in the Administration's written response.

Probably the most important of these issues is that of the possible long-term negative implications to the United States of a liberalized trade policy with China in the event of a freeze of relations between the United States and China or a rapproachement between the Soviet Union and China. A foreshadowing of these considerations seems to have affected the issuance of current U.S. technology transfer policy since it was reported that the Department of Defense (DOD) objected to some aspects of the trade liberalization policies and delayed the issuance of guidelines as potential threats to national security. (Lachia, Anderson.) Other reports indicate that the delay in issuing guidelines "resulted from an attempt by the Administration to appease political conservatives of the far right who object to any improved relationships with Communist China". (Lachia, Anderson, Weisskopf.) However, it was noted during the dialogue that the Department of Defense conducted an assessment, which is classified, that looked at the possible long-term negative implications of an open technology transfer policy with China, and concluded that China was not a strategic threat since it was unlikely that the Soviet Union and China would form a political alliance. DOD said that the United States should allow high-technology transfers and munitions sales to China so long as such sales did not pose a threat to the United States or its allies in the region. Specifically, DOD would allow transfer of military technology that contributed to a buildup of Chinese military capability, but would not allow transfers that made a direct contribution to a specific military technology. Apparently DOD believes it could handle the risk embodied in such transfers. (Hiatt, Kreisberg.)

However, criticisms of these policies are widespread. According to several Members of Congress, the costs incurred from closer contact with a Communist state far outweigh the benefits of increased sales to and trade with the People's Republic of China. For example, Representative John E. Porter has charged that China is an arms suppliers to "Yassar Arafat's wing of the PLO," and since the United States sells arms to China, this Nation will become an indirect arms seller to the PLO. (Porter.) According to Representative Ron Paul, the United States should never even entertain the notion of selling arms to a Communist country, especially when we are interested in resolving the Taiwan question peacefully:

> . . . [I]t makes little sense to arm to the teeth the Communists in Peking who have never renounced their longstanding commitment to annex the last bastion of anti-communism in China [Taiwan]. Our cozying up to the Communists comes precisely at the time then the Communists in China are cozying up to the Communists in the Soviet Union, and we do so in the wildly unrealistic notion that Communists can ever be our allies. Having already built the Soviet war machine only to have the weapons pointed at us, we must never make the same mistake again. (Paul.)

Representative Mervyn Dymally inserted into the *Congressional Record* an article by *Los Angeles Times* writer Robert Scheer that reasoned that the Administration's rapproachement with China raised fundamental questions regarding the logic of U.S.-Far East strategic and long-term policies. Why does the Reagan Administration believe the Chinese are good Communists and the Soviet are bad Communists, he asked? He noted a basic inconsistency in the thinking between candidates Ronald Reagan and President Reagan regarding the threat China posed. The article says that during his campaign Mr. Reagan is reported to have said: "They (China and Russia) were allies, and the only argument that caused their split was an argument over how best to destroy us." Scheer added that candidate Reagan "when asked whether he would 'trust them with sophisticated weapons at some point,' replied: 'No because just like the Soviets broke their agreement—or Hitler broke their agreement with the Soviets, they could turn right around and the day after tomorrow discover that they and the Soviets have more in common than they have with us.' " Sheer also charged that U.S. arming of China makes little sense strategically because it upsets the geopolitical balance of power:

> Surely the defection of China from the Soviet Bloc and its emergence as an avowed enemy armed by the United States, must be interpreted as a severe setback for the Soviets—one that far outweighs whatever gains they have made during the same period in Latin America and Africa. (Dymally.)

Others have cited friendlier relations between China and the Soviet Union and Chinese sales of nuclear technology to third countries, especially to North Korea and Pakistan, as evidence of the potential for China to export COCOM-governed strategic technologies to prohibited Communist and non-Communist third countries. The potential for China to act independently of Western alliance political objectives was seen also in China's refusal to sign the Nuclear Non-proliferation Treaty, which China charges would abrogate her sovereignty and maintain a superpower monopoly on nuclear technology, since she would be obliged to refrain from exporting nuclear reactor technology and fuels to non-signatory third countries. China is a member of the International Atomic Energy Agency (IAEA) and abides by its rules, which do not prohibit such transfers or exports. (Oka, Miller and Donnelly, and Weisskopf, September 18, 1983).

Some critics say that the opening up of Chinese markets may help U.S. business in the short run, but fault current U.S. policies for stimulating long-range technological parity between the United States and China, a parity which may eventually prove costly to this Nation since China, like Japan before it, may supplant U.S. dominance in many foreign markets. According to the dialogue, the Administration's position on this issue is that there is no danger in technological parity because China is a developing country.

Some critics say that the new liberalized U.S.-China policy will damage the Western alliance because some COCOM member states are confused about policies and will view Peking and Moscow as in the same camp, will not permit sales to China, will sell to Moscow just as well as to Peking, or will sell prohibited goods to China. (Weisskopf, May 26, 1983, Anderson, August 15, 1983.) Others suggest that U.S. allies may perceive the U.S. policy of allowing sales of defensive weapons to China as a signal to sell offensive weapons, a move that would further weaken already strained alliance relations.

Questions have also been raised regarding the consistency of U.S. technology transfer policies with the People's Republic of China. Some have suggested that despite the liberalization of U.S. technology transfer and trade policies to China, inconsistencies will persist because of a potential bureaucratic tendency to prohibit sales of strategic goods. (Suttmeier, 1983, p. 67.) There is also inconsistency to the extent that the United States is attempting to control the flow of some scientific and technical information and the academic programs of some Chinese students and scientists here under the auspices of private and public exchange programs.

Congressional interest in these issues continues, as evidenced, for instance, by the hearings during the 98th Congress on New Export Policy Toward People's Republic of China, held by the Subcommittee on International Economic Policy and Trade of the House Committee on Foreign Affairs and hearings on technology transfer by the

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14. AMERICAN-CHINESE SCIENTIFIC AND TECHNICAL RELATIONS*

1. Background

The United States and the People's Republic of China Agreement on Cooperation in Science and Technology was signed by President Carter and Vice Premier Deng Xiaoping in January 1, 1979, soon after the announcement of normalization of relations between the two countries. Scientific and technological relations between the two countries were of special importance to the normalization of relations between the United States and China because China is stressing scientific and technological modernization and China's development had been interrupted by the Cultural Revolution. This pause in China's development occurred at a crucial time when many new advances were being made in Western science, due to refinements in instrumentation and notable breakthroughs in specific fields of science. There are now 21 implementing protocols to the original Agreement for Cooperation in Science and Technology. These are administered by some 14 U.S. departments and agencies.

It appears that despite budgetary problems in China, the Chinese seek to participate fully in these agreements because the programs are so suitable for their needs. At least one reviewer has noted that, although the scientific levels of the two countries are uneven, most of the Americans who participate in the program believe it to be exciting from a scientific viewpoint. In addition, the program has created a structure of familiarity and relationships between the two countries and governments, overcoming 30 years of misunderstanding and isolation. (Suttmeier.)

However, certain problems have become evident in the program of scientific and technological cooperation which seems to warrant attention. According to a recent analysis by Richard Suttmeier (1981), the solutions to these problems require:

The United States to commit funding, especially for travel, on a more sustained basis,

Better cooperation in between the U.S. Government and the U.S. private sector in order to better match opportunities for cooperation with available resources,

Better clarification and consistency between the workings of U.S. export control policy and export control machinery,

Consideration by the United States of awarding concessionary funding or establishing an endowment fund with contributions from both sides for some of the activities conducted under the accords,

Broadening of public awareness of the program, and

Providing the Chinese with more imformation about applications-oriented contract research in a manner mutually beneficial to both sides.

2. Commentary

The Administration's response conveyed the view that the United States-People's Republic of China Agreement on Cooperation in Science and Technology is one of the factors that "helped form the substance necessary to a sound, long-term relationship between the two countries." The Chinese attributed the following motives to the agreement, according to the Administration's response:

They view the West and Japan as sources for technology to further China's development and advance the "Four Modernizations." They see the U.S. as the only country with the scientific base and resources large enough to meet China's requirements on a broad front, especially its desperate need to train technical personnel.

The response described the origin of the basic agreement, signed by President Jimmy Carter and Vice Premier Deng Xiaoping in January 1979; the implementing protocols; and some of the activities conducted. Seventeen protocols sanctioned by the agreement had been signed by the time of the Administration's response, in early 1983. Presidential Science advisor George A. Keyworth, Jr. headed a high-level U.S. delegation to the third meeting of the U.S.-P.R.C. Joint Science and Technology Commission in May 1983. At the conclusion of the meeting, three new protocols on cooperation were signed. They are in Nuclear Physics and Magnetic Fusion; Aeronautical Science and Technology; and Transportation Science and Technology. In

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addition to the new accords, a Memorandum of Understanding on Cooperation in the Basic Biomedical Sciences was signed. The agreements and executive agencies are listed next:

U.S.-P.R.C. Science and Technology Agreement and Implementing Protocols

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Understanding on the Exchange of Students and Scholars (October 1978)—USIA.
Understanding on Agricultural Exchange (November 1978)—USDA.
Understanding on Cooperation in Space Technology (December 1978)—NASA.
Implementing accord in the Field of High Energy Physics (January 31, 1979)—DOE.
Protocol on Cooperation in the Fields of Management of Science and Technology and Scientific and Technical Information (May 8, 1979)—USDOC.
Protocol on Cooperation in the Fields of Metrology and Standards (May 8, 1979).USDOC-NBS.
Protocol on Cooperation in the Field of Atmospheric Science and Technology (May 8, 1979)—NOAA, NSF.
Protocol on Cooperation in the Field of Marine and Fishery Science and Technology (May 8, 1979)—NOAA, NSF.
Protocol for Cooperation in the Science and Technology of Medicine and Public Health (June 22, 1979)—DHHS.
Protocol on Cooperation in Hydroelectric Power and Related Water Resource Management (August 28, 1979)—USDOC.
Protocol for Scientific and Technical Cooperation in Earthquake Studies (January 24, 1980)—USGS.
Protocol for Scientific and Technical Cooperation in the Earth Sciences (January 24, 1980)—USGS.
Protocol on Scientific and Technical Cooperation in the Field of Environmental Protection (February 5, 1980)—EPA.
Protocol on Cooperation in the Basic Sciences (December 10, 1980)—NSF.
Protocol on Cooperation in the Field of Building Construction and Urban Planning Science and Technology (October 17, 1981)—HUD.
Protocol on Cooperation in Nuclear Safety Matters (October 17, 1981)—NRC.
Protocol on Scientific and Technical Cooperation in the Study of Surface Water Hydrology (October 17, 1981)—USGS.
Protocol on Cooperation in Aeronautical Science and Technology (May 11, 1983)—NASA.
Protocol on Cooperation in the Fields of Nuclear Physics and Controlled Magnetic Fusion Research (May 11, 1983)—DOE.
Protocol on Cooperation in Science and Technology of Transportation (May 11, 1983)—DOT.
Memorandum of Understanding on Cooperation in the Basic Biomedical Sciences (May 11, 1983)—NIH.

The Administration's response listed the multiple motives which impelled and have sustained the cooperative science and technology relationship with the People's Republic of China. However, several questions can be raised about the priority, rank and long-term implications of these motives. Although the agreement clearly is called the "Agreement on Cooperation in Science and Technology," the priority of "mutual benefit in science and technology," a *sine qua non* of all the accords, is ranked third by the Administration in order of importance. The Administration identified political and security objectives as the principal reasons for cooperation. These motives were defined as follows:

> Politically, the exchanges have added needed substance to the normalization process by fostering an expanding network of institutional and personal relationships between the S & T establishments of the two countries. They have also helped China advance in economically relevant areas of science and technology and thereby serve U.S. interest in participation in Chinese development.

Presumably, the United States also seeks to promote the development of a cadre of Chinese students, most likely a future political elite, trained in and thereby, predisposed to the United States. (Suttmeier, 1982, p. 60.)

Trade, that is the opening up of commerce and markets in China for U.S. products, is listed as the second motivating factor.

Precedent indicates that there may be potential problems with the substance of the scientific exchange program if it is valued in the United States primarily for its political and trade benefits, and in China primarily for its scientific merit. Analyses of the quality of research undertaken under the aegis of other bilateral science and

technology agreements to which the United States is a party show that usually there is an inverse relationship between the salience of political motives in bilateral science agreements and the quality of science pursued. (Garwin; Kaysen; Committee on Concerned Scientists; Science, Technology, and American Diplomacy, 1982). There is no mention in the Administration's response of this potential dilemma and how it might affect the U.S.-P.R.C. scientific and technological relationship. U.S. scientists probably will continue to participate in the scientific programs with China to the extent that they are drawn by the unique, exotic and unknown offered by Chinese science. However, it remains to be seen whether American scientists will, over the years, find opportunities for research in China offering the rigor of laboratory and field settings required to develop a "publishable" paper. Scientific agreements with other developing countries have begun to flounder for lack of interest by U.S. scientists.

There are indicators now that more Chinese than Americans participate in the cooperative programs. For instance, according to the Department of State in the *1982 Report on Science, Technology and American Diplomacy,* Chinese science and technology exchange students in the United States outnumber U.S. exchange students about 22 to 1. In greater detail:

> Including those in China, over 200 American scholars and students have pursued study and research in China in a program supported by U.S. cooperating agencies and the private sector. An estimated 4,500 Chinese Government sponsored students and scholars are now studying or doing research at U.S. institutions. Some ⅔ are in the hard sciences . . . (Science, Technology, and American Diplomacy, 1983, p. 113.)

Development of a long-term strategic relationship between China and the United States is also listed among the core motivating factors for scientific and technological cooperation in the Administration's response:

> . . . the Administration will continue to seek expanded and strengthened relations with the PRC, both as a near- and long-term objective. This aim is to achieve steady growth consistent with U.S. political, economic, and national security interests. This will be true of relations in science and technology as it is in other aspects of the relationship.

As described in the commentary section to question 13 in this report, the United States, during 1983, liberalized technology transfer and trade relations with China to the country status of V, a friendly nonallied country in the same category as Switzerland. Now the United States will allow the issuance of export licenses to China for sales of high technology and munitions so long as they pose no threat to the United States or its allies in the region or as long as the United States can handle the threat. Specifically, according to the rules governing exports to China, except for ". . . exports that would make a direct and significant contribution to nuclear weapons and their delivery systems, electronic and anti-submarine warfare, intelligence gathering, power projection, and air superiority," China will be able to purchase any goods, including defensive weapons or technology that contributes to Chinese military capability. (People's Republic of China; Export Control Policy; Placement in Country Group V.)

No mention was made in the Administration's written response about whether the United States had assessed the possible long-term negative implications of transferring science and technology to China. Could the People's Republic of China ever become a significant technological competitor on the basis of skills and information transferred from the United States? Would China use its American-generated scientific and technological knowledge to the disadvantage of the United States should there ever be significant rapprochement between China and the Soviet Union? China has displayed considerable independence in the nuclear arena. Although it is a member of the International Atomic Energy Agency, it refuses to agree to the terms of the Nuclear Non-proliferation Treaty and, therefore, may become a reexporter of nuclear technology to Pakistan and such Communist states as North Korea.

Several academic treatises conclude that the long-term economic and strategic interests of the United States are best served by a secure relationship with China. (Atlantic Community Council.) Discussions during the workshop portion of the dialogue indicated that the Department of Defense had analyzed the risks involved in liberalizing trade and technology transfer relations with the P.R.C. and concluded that it would be in the long-term interests of the United States to liberalize relations. This study is classified. However, the fact that such a study was completed indicates the concern in some quarters about potential long-term problems which might occur with a change in China's foreign policy. Also there is no public information available to indicate that China or its citizens will not transfer sensitive technologies ille-

gally to third countries. It seems apparent that public understanding of the impact of the agreement on national security and potential trade and security benefits requires analysis of long-term futures.

Other analyses of the U.S.–China scientific and technological exchange program (Suttmeier, 1981, Suttmeier, Mar. 1982) and hearings held on this subject by the Special Subcommittee on Trade with China in 1983 have discussed the inconsistencies in U.S. scientific and technological policy toward China. For instance, in the past, fears of the transfer scientific and technological information sensitive to national security have compelled policymakers to seek surveillance of some Chinese researchers and scholars; have prohibited Chinese from attending some scientific conferences in which DOD-sponsored research papers were to be discussed; and have led to dockside and airport searches of the luggage of Chinese scholars returning home. In addition, as the Administration's response noted, additional confusion and misconceptions persist about the science and technology relationship with China since some of the American-sponsored activities are private and:

> . . . the distinction between "official" and "private" exchanges is somewhat blurred in Chinese eyes. Among other[s] the sale or transfer of equipment and technical data to China are subject to U.S. Government export licensing requirements, a process that gives the whole process of technological cooperation, whether under private or government auspices, an official air to the Chinese.

It remains to be seen whether the recent release of rules governing the liberalization of technology transfer policy with China will be followed by development of consistent policies to govern scientific and technological exchange personnel. So long as they persist, policy inconsistencies, discrepancies, and fears raise considerable ambiguity for both U.S. and Chinese policymakers interested in promoting free scientific and technological exchange. As long as they continue they will hamper a totally free exchange. There was no indication in the Administration's response that these dilemmas have been solved. However, during the dialogue it was noted that COCOM is studying the issue of personnel exchanges. The Special Subcommittee on Trade with the People's Republic of China, of the House Committee on Energy and Commerce, held two separate sets of hearings in 1983 on the issue of scientific exchanges and technology transfer with China.

Two specific kinds of scientific benefit will accrue to the United States from the Agreement on Cooperation in Science and Technology according to the Administration response. The first kind results from the unique Chinese geographic location and population makeup:

> Scientific benefits accrue from investigations in cooperation with Chinese specialists in China. The benefits mostly derive from special conditions in China, such as high level of seismicity conditions which permits efficient study of earthquake prediction, or the large, geographically stable population which makes possible epidemiological studies of great interest to the U.S. medical community.

As noted above, questions can be raised about whether the scientific merits of these conditions alone justify an exchange agreement intended to provide mutual scientific benefits to the United States and China. A facade of mutuality may not be a problem if the agreement is justified primarily in terms of politics. However, it is a problem if the Chinese and U.S. policymakers expect high-level U.S. scientists to participate in the program for its scientific merit. As noted above, there already is evidence that there is an imbalance in the scientific aspects of the relationship, with far fewer U.S. than Chinese participants. In addition, the National Science Foundation has described a potential lack of reciprocity in basic science research cooperation and the possible need for the science and technology relationship with China to be based more on the foundation of developmental assistance:

> Although no major problems have been encountered in the operation of the programs to date, attention should be given to potential difficulties which may arise in the future. Two factors are at play. First, while the U.S. adheres rather strictly to a policy of mutual short-term scientific benefits, the Chinese expect more of a developmental assistance relationship to support the policy of enhancing China's scientific and technological capabilities. Second, the scientific priorities of the two sides are imperfectly matched. Many U.S. priority interests are of relatively low priority on the Chinese side (the social sciences being the most extreme case) whereas Chinese priorities involving advanced technology often conflict with U.S. export control policies. Continued smooth operation will depend on both sides emphasizing areas of common interests and displaying flexibility in tradeoffs. (Science, Technology, and American Diplomacy, 1983.)

The Administration cited a second scientific benefit to the United States of the agreements with China: "Scientific manpower becomes available to the U.S. scientif-

ic community as Chinese exchange scholars contribute to research at U.S. institutions." There are some negative aspects to this broadening of scientific manpower that the Administration did not address in the dialogue. One is the issue of braindrain. If the United States trains Chinese scientists to replace American scientists, will the United States be faced with the possibility of charges of promoting an alleged braindrain from China since some Chinese have sought asylum in the United States? Another issue is the fact that in most U.S. universities foreign students comprise over 50 percent of the students in some graduate scientific and technological programs. The Chinese undoubtedly comprise a significant portion of these students. Should not the United States endeavor to train more of its own nationals in science and technology at the graduate level?

Several other questions remained unanswered following the dialogue.

As the response indicated, the Chinese view all exchanges with the United States as governmental exchanges, despite the fact that most are privately arranged. Would the program be more effective if some effort were made to coordinate exchange activities?

Another issue not addressed in the dialogue is that of uncoordinated and insufficient funding. One factor which probably contributes to the low rate of U.S. participation in the exchanges is that the sending or "benefitting side pays" and U.S. public and private funds for international science are meager at best. (Science, Technology, and American Diplomacy, 1983, p. 113.) As pointed out (by Suttmeier, 1982), all U.S. Government-funded programs for China must be paid for by Federal agencies which do not have especially appropriated funds for scientific cooperation with China and must justify their participation in terms of its contribution to a domestic scientific or technological mission. (Suttmeier, 1982, p. 62.) The Environmental Protection Agency reported the following related problem in the 1982 Title V report:

> The two sides continue to differ on issues of funding and supply of U.S. equipment. Further cooperation with China on environmental problems will depend upon relevance to the Agency's domestic responsibilities. (p. 117.)

According to Suttmeier, exchange activities with the Chinese would be considerably improved if U.S. agencies funded more of the Chinese activities in this country; if there were sustained funding for programs with China; if funds were available specifically for the travel of U.S. scientists to China; and if the Government created an endowment in funding joint research activities on a sustained basis. (Suttmeier, 1981; Suttmeier, 1982; Suttmeier, 1983.) Apparently concessionary aid had been promised to the Chinese, thus widening Chinese expectations for the benefits of U.S. S & T. According to Fingar, 1982:

> The Carter Administration raised Chinese expectations that assistance would be provided as a type of development aid even as it was assuring the Congress that such was not the case. There is justification, therefore, for the complaint of political leaders who say that, if they had understood the terms better, they would not have responded positively to so many United States initiatives.

The current lack of concessionary aid and the absence of sustained departmental funding for S&T exchanges may compromise the achievement of U.S. foreign policy objectives.

The apparent need for more coherence in U.S. science and technology exchange programs with the People's Republic of China seems all the more imperative since there is evidence that contact with the West requires the Chinese to modify internal scientific structures and causes rivalries between academic centers and laboratories competing to obtain funds for and a place in the program of exchange activities with the United States. (Fingar, 1982.)

U.S.-P.R.C. Agreement on Cooperation in Science and Technology References

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U.S. Congress. House. Committee on Energy and Commerce. Special Subcommittee on Trade with China. Protocols between United States and the People's Republic of China under the 1979 Science and Technology agreement. Oct. 31, 1983.

U.S. Congress. House. Committee on Foreign Affairs and Science and Technology. Science, Technology, and American diplomacy, 1983. Fourth annual report submitted to the Congress by the President pursuant to section 503(b) of Title V of Public Law 95–426. 98th Congress, 1st session. Washington, U.S. Govt. Print. Off., 1983. Joint Committee Print.

Weisskopf, Michael. Peking official sees better U.S. ties. Washington Post, Sept. 18, 1983: A30.

15. U.S. GOVERNMENT ORGANIZATION FOR TECHNOLOGY TRANSFER CONTROL*

1. Background

A variety of governmental entities are involved in regulating technology transfers from the United States. At least three reasons may be offered to explain this diversity of actors. First, there are different programs which have a bearing upon technology transfer, ranging from visiting scholar exchanges to export licensing to special disclosure restrictions in research and development contracts. Second, specialized expertise from various quarters of the government may be brought to bear upon technology transfer matters at different times. Third, there are institutional interest controversies which affect technology transfer regulation—for example, whether to vest both export administration and international trade promotion in the Department of Commerce; whether to grant more resources to the Department of Commerce for better enforcement of export controls or to transfer this responsibility to more experienced customs agents of the Department of the Treasury; or whether to increase the authority of defense officials in technology transfer policy or defer instead to non-military leadership in these matters.

Within the executive branch, primary responsibility for regulating technology transfers from the United States appears to be vested in the Departments of Commerce, Defense, and State. Both the Department of Energy and the Nuclear Regulatory Commission have special export authority in the nuclear energy area and entities such as the Department of Agriculture, Department of Justice, Department of the Treasury, National Science Foundation, and units of the Federal intelligence community have varying support functions.

Within the legislative branch, various committees of Congress may become involved in technology transfer policy and practice through the exercise of legislative, authorization, appropriation, and oversight powers. In this regard, a number of jurisdictions may be involved, including agency efficiency and economy of operation, energy, foreign policy, foreign commerce, intelligence, international trade, law enforcement, national defense, national security, science and technology. Special assessments and policy analyses of technology transfer regulation may be made by congressional support agencies.

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*Prepared by Harold Relyea, Specialist, Government Division.

Within the U.S. business and scientific communities there are a vast number of entities having varying degrees of interest in government regulation of technology transfers. They include individual companies and universities, trade associations, professional organizations, special interest groups, laboratories and development firms, and editors and publishers, among others.

Occasionally, special organizations of varying duration have been created to allow selected government and private sector representatives to discuss and to assess technology transfer regulations. Recent examples of this type of body include the Defense Science Board Task Force on University Responsiveness to National Security Requirements, the Panel on Scientific Communication and National Security sponsored by the National Academy of Sciences, and the Department of Defense-University Forum. [See: Bibliography, app. III.]

A variety of proposals are being discussed in both the legislative and executive branches of government to reallocate responsibilities for regulating technology transfers. These include modifying the present configuration through extension and revision of the Export Administration Act, creating a new cabinet-level Department of Trade, or establishing an Office of Strategic Trade as an independent executive agency.

The policy of exerting strict peacetime controls over United States private commercial exports to certain countries for reasons of national security began under the duress of the Cold War with the Export Control Act of 1949. The Central Intelligence Agency (CIA) was created by the National Security Act of 1947. At the time the CIA was established, both the Army and the Navy had their own intelligence services. The Department of State also had an intelligence capability. It is not readily apparent, however, as to when and to what extent U.S. intelligence forces were dedicated to assessing the techniques, extent, and implications of Soviet acquisition of U.S. technology subject to export control.

Today, the Federal intelligence community consists of the Central Intelligence Agency; the National Security Agency; the Defense Intelligence Agency; offices within the Department of Defense for the collection of specialized national foreign intelligence through reconnaissance programs; the Bureau of Intelligence and Research of the Department of State; the intelligence elements of the individual armed services; the Federal Bureau of Investigation; the Department of the Treasury; and the Department of Energy; and the staff elements of the Director of Central Intelligence (DCI). Current intelligence community commitment to monitoring and assessing Soviet acquisition of U.S. technology was revealed in an interview with Director of Central Intelligence William J. Casey. There he announced the seemingly recent establishment of "a technology transfer center at the CIA that has taken a very comprehensive look at the whole question of the degree to which American research and development—and Western technology generally—has contributed to the increased accuracy, sophistication, precision, power and countermeasure capability of the Soviet arsenal." [U.S. News & World Report. v. 92, 3/8/82, p. 24] However, a recent report of the Senate Permanent Subcommittee on Investigations concerning the transfer of U.S. high technology to the Soviet Union indicated that, in March 1981, the CIA had begun "to assemble information on military gains the Soviets have registered in obtaining Western technology." [97th Cong., 2nd sess., Senate Report No. 97-664, p. 3.] The result of this effort was a study entitled "Soviet Acquisition of Western Technology," which was publicly released in April 1982. Summarizing the CIA study, the Senate Permanent Subcommittee report said: "by acquiring Western technology, the Soviets saved hundreds of millions of dollars in research and development costs, achieved improved weapons performance and incorporated countermeasures to Western weapons early in the development of their own weapons programs" and added that, "in terms of financial gains and losses, the West has lost more from sales to the Soviets than it has gained; that is, if the West pursues the costly objective of trying to keep pace with Soviet military gains." [Ibid., p. 4-5.] Testifying before the Senate Permanent Subcommittee some months earlier, CIA Deputy Director Bobby R. Inman made the following confirmation: "In the wake of the study document, the DCI has established a Technology Transfer Intelligence Committee along with a dedication of analytical resources which had not previously been committed to the problem and new mechanisms to coordinate how the intelligence community pursues intelligence collection, analysis, and reporting, and new subcommittees to support the activities of the other departments as they try to bring better coordination and better formulation of policy." [U.S. Congress. Senate. Committee on Governmental Affairs. Transfer of United States High Technology to the Soviet Union and Soviet Bloc Nations. Hearings, 97th Cong., 2nd sess., p. 236-237.]

2. Commentary

With regard to the overall adequacy of Government organization for technology control matters, departmental respondents, in both their written comments and public presentations, stressed two interagency processes—the interagency export licensing system and interagency coordinating groups, such as the Advisory Committee on Export Policy and the Export Administration Review Board. Special emphasis was given to newly created Senior Interagency Groups (SIGs) which, according to written comments, "have played an increasingly active role in shaping East/West trade policy." The activities of one of these entities—the Senior Interagency Group on the Transfer of Strategic Technology were described recently by Dale R. Tahtinen, Deputy Assistant Secretary of State for International Trade Controls, as follows:

> The Group constitutes a forum for policy determination to coordinate the ongoing work of all the agencies that have technology programs or interests. One of its major functions has been the identification of problems and tasking of activities to deal with them. For example, the Senior Group has undertaken a public awareness program and a number of intelligence assessments of technology diversion problems in specific areas, and has encouraged increased attention to the improvement of U.S. extradition and legal assistance treaties with other countries to strengthen export control enforcement. It also has initiated a review of the training of U.S. officials involved in export control matters. I believe that this Senior Inter-agency Group will continue to play an important role in our efforts to deal with the problem of the transfer of sensitive technologies to the Soviet Union and the Warsaw Pact countries.[1]

This particular emphasis on these interagency processes, however, while certainly accentuating positive efforts toward an efficient and effective organization for technology transfer control, ignored certain serious functional and policy conflicts of public note which have affected technology transfer control arrangements within the executive branch. For example, although a Senate subcommittee had urged in 1982 that enforcement of export laws be clarified and shared by the Commerce Department with the Customs Service of the Treasury Department,[2] a recent press report indicated not only that this suggestion was ignored, but also that their jurisdictional disputes over export enforcement and problems with inexperienced investigators were hampering technology control efforts.[3] Disputes over export control policy recently prompted an Assistant Secretary for Trade Administration to leave the Commerce Department and the Director of the Office of East-West Trade to leave the State Department.[4] At the Department of Defense, the Office of the Under Secretary for Policy and the Office of the Under Secretary for Research and Engineering were in dispute over their roles regarding technology transfer policy.[5] And Defense Department dissatisfaction with the Commerce Department export licensing of high technology equipment was evident in the press in December.[6]

Executive branch participants in the dialogue session were understandably reluctant to discuss these disputes and their implications for Government organization for technology transfer control. Nevertheless, they did acknowledge the existence of these conflicts and their troublesome effect upon structural arrangements for implementing technology transfer controls.

Perhaps, because of a desire to avoid discussing policy and administrative conflicts over technology transfer control, executive branch participants in public sessions had very little to offer regarding current executive branch leadership structure for coordinating policy implementation or decisionmaking on new technology transfer control policy. The role of the Senior Interagency Groups was reiterated.

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[1] Dale R. Tahtinen. "Critical Technology Controls: Issues and Outlook." Prepared address to the Technical Marketing Society of America. Los Angeles, California. September 13, 1983, p. 13.

[2] See U.S. Congress. Senate. Committee on Governmental Affairs. Permanent Subcommittee on Investigations. Transfer of United States High Technology to the Soviet Union and Soviet Bloc Nations. S.Rept. 97-664, 97th Congress, 2d session. Washington, U.S. Govt. Print. Off., 1982, pp. 35-44, 62-63.

[3] Paul Mindus. Turf Squabbles and Inexperience Hamper Technology Guardians. *Washington Post*, October 27, 1983, p. A21.

[4] See Paul Mann. New Rules Ease U.S. Exports to China. Aviation *Week & Space Technology*, v. 119, October 3, 1983, p. 23.

[5] See Paul Mann. New Center to Oversee Export Licenses. Aviation *Week & Space Technology*, v. 119, September 19, 1983, p. 71-74; Paul Mann. Export Policy Triggers Dispute. *Aviation Week & Space Technology*, v. 119, December 19, 1983, p. 18-19.

[6] See Warren Brown. Seized Computer Put on Display: Plan to Control Exports Promised. *Washington Post*, December 20, 1983, p. D7, D8.

State Department representatives tended to indicate the importance of liaison and coordination efforts of their department in the export control area by describing the general responsibility that State has for advising the President on the conduct of foreign relations and administering certain legislative and executive directives, including the Export Administration Act of 1979, the Arms Export Control Act of 1976, and E.O. 11958. No mention was generally made, however, of the role of the Department of Defense in the initiation and development of technology transfer control policy, even though many observers would agree that DOD has growing visibility and influence regarding such matters.

Similarly, although executive branch members were often encouraged to comment on problems that congressional organization may generate regarding technology transfer control policy or practice, only very general remarks about the multiplicity of committees and subcommittees having a role or interest in the policy area were offered. Characteristically, when asked about the desirability of having Congress make major policy in the technology transfer control area, executive department representatives noted the strong, independent role taken by the House in revising the Export Administration Act. There was no discussion of the possibility of establishing new technology transfer controls administratively by changing departmental regulations, an approach which the Defense Department reportedly was considering for creating an ambitious new technology control program.[7]

Finally, executive branch written responses indicated generally that organizational arrangements were adequate to facilitate outreach to the scientific and business communities regarding the Government's technology transfer control efforts. It was reported that the Commerce Department was being helped by the academic community, the National Science Foundation, and the National Academy of Sciences in an effort to clarify its technical data regulations. The Department also has instituted a series of lectures to help the business community understand the Export Administration Regulations, and has begun "a program of public presentations designed to actively encourage the private sector to voluntarily comply with Commerce's expert regulations."

While additional outreach activities might be detailed, some question exists regarding the adequacy of these kinds of efforts. The scientific community appears to be particularly anxious about new technology transfer controls impeding traditional scientific communication and there is concern, as well, that the findings and recommendations of the National Academy of Sciences' report, *Scientific Communication and National Security,*[8] have been ignored by the Administration. Corporations, trade associations, and business groups have been especially vigorous in presenting their displeasures, worries, and concerns regarding technology transfer controls to Congress during the course of efforts to revise and extend the Export Administration Act. Thus, indications are that the executive branch might do more to involve both science and business interests in its formulations of technology transfer control policy, but it is not clear that any current inadequacies in this regard derive from organizational arrangements. Further attention is given to this matter in the section concerning technical data flow.[9]

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[7] See Richard Barnard. Pentagon Weighs New Strictures on Unclassified Papers. *Defense Week*, v. 4, October 24, 1983, p. 1, 10.

[8] See National Academy of Sciences. Panel on Scientific Communication and National Security. *Scientific Communication and National Security.* Washington, National Academy Press, 1982.

[9] See. infra, pp. 39-46.

APPENDIX III. BIBLIOGRAPHY PREPARED BY THE CONGRESSIONAL RESEARCH SERVICE

PREFACE

This bibliography presents works on East-West trade and the impact of technology transfer on Communist countries and on the West and other non-Communist countries. An index at the end groups materials by major topic: general discussions of East-West technology transfer; Soviet, Chinese and other Communist countries acquisition of Western technology; export controls and the Export Administration Act; scientific communication, national security, and security classification; trade sanctions and embargoes; the Soviet pipeline; and technology transfer and energy development.

The bibliography primarily covers the period from 1979 to the present, though a few earlier works are included. Most citations are annotated and have been drawn from the computerized bibliographic data base created and maintained by the Library Services Division of the Congressional Research Service. The remaining material was selected from the Library of Congress catalogs.

1. EAST-WEST TECHNOLOGY TRANSFER: SELECTED REFERENCES*

Abbott, Kenneth W. Linking trade to political goals; foreign policy export controls in the 1970s and 1980s. Minnesota law review, v. 65, June 1981: 739-889.

Partial contents.—The export control system.—The growth of foreign policy export controls.—The theory of foreign policy export controls.—The Export Administration Act of 1979.

Adler-Karlsson, Gunnar. Western economic warfare 1947-1967. A case study in foreign economic policy. With a foreword by Gunnar Myrdal. Stockholm, Almqvist & Wiksell (distr.) 1968. 319 p. (Stockholm economic studies. New series, 9)

Acta universitatis Stockholmiensis.

Agres, Ted. Concerted Soviet efforts siphon Western technology. Industrial research & development, v. 24, June 1982: 95, 98, 100, 102.

Inquires into a report published by the CIA which warns of a Soviet effort to acquire Western technology of military significance through legal and illegal means.

Alexander, Christine. Preserving high technology secrets: national controls on university research and teaching. Law and policy in international business, v. 15, no. 1, 1983: 173-240.

Article concludes that "the technology control devices employed by the government are, at best, stop-gap measures of limited usefulness. More critically, the control may result in serious disruption of the open nature of U.S. scientific inquiry and discourse, and may retard U.S. technological progress. In seeking to deter its challengers, the United States may be imposing restrictions which could prevent it from advancing quickly beyond current technological levels."

American Association for the Advancement of Science. Committee on Scientific Freedom and Responsibility. National security and scientific communication: highlights. A summary of responses received in reply to a letter from the AAAS Committee on Scientific Freedom and Responsibility. Washington, 1982. 1 v. (various pagings)

Summarizes the opinions of leading American scientists and engineers who were asked to respond to the following questions: "Is there a basic conflict between the principle of open scientific communication and national security? Is the current system for classifying or restricting access to scientific and technical information on national security grounds too restrictive, generally satisfac-

*Prepared by B. F. Mangan, Senior Bibliographer, Science Library Services Division.

tory, or too permissive? How should scientists and engineers respond to government efforts to restrict or classify the communication of research information on the basis of national security interests?"

American Enterprise Institute for Public Policy Research. Proposals for reform of export controls for advanced technology. Washington, 1979. 32 p. (Legislative analysis no. 5, 96th Congress)

Examines "the principal arguments favoring greater restrictions on the export of high technology as well as those favoring a more liberalized trade posture for such items."

Ball, George W. The case against sanctions. New York Times magazine, Sept. 12, 1982: 63, 118–120, 126.

A former American diplomat warns that President Reagan's attempt to block the Soviet-European gas pipeline project is bound to fail, and it will do more harm to the Western alliance than to the Soviet economy.

Barnard, Richard. Pentagon mulls new technology secrets list. Defense week, v. 4, Oct. 17, 1983: 1, 5.

Reports on how "a multi-agency task force on the control of information and documents about 'militarily significant technologies' wants to create an entirely new category of information to be routinely restricted by the Pentagon bureaucracy. This new category—code-named METAL (Military Significant Emerging Technologies Awareness List)—is in addition to DoD's broad range of classified papers and would be an appendix to the Pentagon's existing Military Council Technologies List, a classified document of at least 700 pages which gives the Pentagon a virtual veto over exports and, beginning last October 1, control over information that is released to the American public."

——— Pentagon weighs new strictures on unclassified papers. Defense week, v. 4, Oct. 24, 1983: 1, 10–11.

Analyzes a Pentagon report that calls for restrictions on the availability of unclassified defense documents. The proposed controls would use existing export laws to limit information available to Americans. According to the Pentagon the restrictions are necessary so that the government can limit "militarily sensitive" material now available to the Soviet Union and its allies.

Basiuk, Victor. Implications of differential transfer of technology to the USSR and resultant options for U.S. technology transfer policy. McLean, Va., Science and Technology Policy, 1981. 103 p.

Contents.—The spectrum of avenues for power-relevant change in the Soviet Union.—The growth of interests in the USSR.—Soviet economic difficulties and remedial efforts.—Soviet technology transfer: its role, dimensions and impact.—Growing economic constraints and leadership succession.—Conclusions: implications for U.S. technology transfer policy.

Baum, Richard, ed. China's four modernizations: the new technological revolution. Boulder, Colo., Westview Press [1980] 307 p.

Partial contents.—Recent policy trends in industrial science and technology, by T. Fingar.—The institutional structure for industrial research and development in China, by R. Suttmeier.—China's program of technology acquisition, by S. Brown.—The absorption and assimilation of acquired technology, by R. Volti.—China's energy technology, by V. Smil.—The modernization of national defense, by J. Pollack.

Berliner, Joseph S. The innovation decision in Soviet industry. Cambridge, Mass., MIT Press, c1976. 561 p.

Bertsch, Gary K. East-West strategic trade, COCOM and the Atlantic Alliance. [Paris] Atlantic Institute for International Affairs [1983] 52 p. (Atlantic papers, no. 49)

The author notes that "the progression from control on strategic exports to the East, on which there was, and is, a substantial consensus within the [Atlantic] Alliance, to controls as sanctions or penalties for Soviet political behavior, catalyzed debate within the Western Alliance on the many tough questions about East-West trade, technology transfer and export controls." This work traces the history of Western technology sales to the East and export controls and it examines Western efforts to control the sales of strategic technology.

——— East-West technology transfer and export controls, by Gary K. Bertsch and others. Osteuropa-Wirtschaft, v. 26, June, 1981: 116–136.

"This paper examines (1) the nature (mechanisms, level, and impact) of West to East technology transfers, (2) the performance (responsiveness and effectiveness) of the multilateral Coordinating Committee (COCOM) in restricting the eastward flow of technology, and (3) competing Western rationales for restricting technology transfers. The paper concludes that while COCOM's survival in

the short term may rest on its ability to deal with the exigencies of the moment, its long term effectiveness depends upon agreement on a coherent, realistic export control rationale. In the absence of such agreement, any new system is likely to display many of the shortcomings of the one it replaces."

Bertsch, Gary K. U.S. export controls: the 1970's and beyond. Journal of world trade law, v. 15, Jan.-Feb. 1981: 67–82.

"The new Export Administration Act, signed by President Carter on 29 September 1979, was intended to make significant improvements on past policy. Overall, modifications were made to streamline the licensing process, assure that necessary national security restrictions are maintained, bring the imposition of short supply and foreign policy controls under closer Congressional scrutiny, make the administration of export controls more predictable, and improve multilateral COCOM coordination and enforcement. Of course, implementation of these reforms cannot be taken for granted."

——— US-Soviet trade: the question of leverage. Survey, v. 25, spring 1980: 66–80.

Examines the variety of different perspectives on the feasibility of employing trade as an instrument to bring about a more desirable Soviet policy. Concludes that "there are indeed real limits to US leverage."

Bingham, Jonathan B., and Victor C. Johnson. A rational approach to export controls. Foreign affairs, v. 57, spring 1979: 894–920.

The authors discuss the Export Administration Act in the context of using export controls for foreign policy purposes. They propose key guidelines for the act's revision and conclude "that trade is in itself good for us; that there are limits to our influence; that export controls, like all aspects of foreign policy, must be as open and as accountable as possible; that we have to be clear about our objectives and, in trying to shape a policy, must avoid simple answers; and that our trade policy should be an expression of what is good and not what is vindictive in us."

Biro, Gerd. The increasing importance of the transfer of technology to Hungary's economy. ACES [Association for Comparative Economic Studies] bulletin, v. 19, fall-winter 1977: 45–54.

Brada, Josef C. The interface of different systems: the United States and Communist countries. In Internationalization of the American economy. Philadelphia, American Academy of Political and Social Science, 1982. (Annals, v. 460, Mar. 1982) p. 136–144.

Surveys trade policy issues.

Brougher, Jack. U.S.-U.S.S.R. trade after Afghanistan. Business America, v. 3, Apr. 7, 1980: 3–14.

Reviews the possible impact of U.S.-U.S.S.R. trade restrictions imposed following the Soviet invasion of Afghanistan. Includes a chronological of U.S. Government actions restricting trade with the Soviet Union.

Bryan, Paige, Scott Sullivan, and Steve Pastore. Capitalists and commissars. Policy review, no. 22, fall 1982: 19–54.

Contend that East-West trade has been detrimental to Western countries. Cite excessive amounts of loans and credits, the Siberian pipeline, and the transfer of strategic technology as examples of bad deals in the name of corporate profits. Conclude that "if the national security of the United States and the West as a whole is considered of paramount importance, certain American business interests may have to be subordinated to the public weal."

Bucy, J. Fred. Technology transfer and East-West trade: a reappraisal. International security, v. 5, winter 1980: 132–151.

Contends that large continuing exports of high-growth technologies to the Soviet Union have "potentially far-reaching military, economic, and political consequences."

Canto, Victor A., and Arthur B. Laffer. The incidence of trade restriction. Columbia journal of world business, v. 17, spring 1982: 60–66.

"This paper applies Harberger's incidence analysis to commodity embargoes. It analyzes the economic effect of a commodity trade embargo under alternative assumptions regarding technological differences across countries as well as different degrees of factor mobility. The results are then used to analyze the effects of the US embargo on Occidental petroleum shipment of superphosphoric acid to the Soviet Union. The available information suggests that the embargo has had a minimal effect on the Soviet Union, while it has imposed a significant cost on Occidental, and on the US economy in general."

Carrick, Roger John. East-West technology transfer in perspective. Berkeley, Institute of International Studies, University of California, c1978. 93 p. (Policy papers in international affairs, no. 9)

Maintains that it is in the West's self-interest to allow non-strategic advanced technology to be transferred on a commercial basis and in a reasonably controlled way to the Soviet Union in the hopes of fostering a positive stable relationship.

Cheh, Mary M. The Progressive case and the Atomic Energy Act: waking to the dangers of government information controls. George Washington law review, v. 48, Jan. 1980: 163–210.

"This article outlines the historical and legislative background of the Atomic Energy Act's controls over privately developed information, examines how these controls have been applied, and discusses whether they are justifiable as a matter of law or policy. A central inquiry is whether Congress, in enacting the Atomic Energy Act, intended to depart from customary classification practice and impose secrecy on non-governmental, privately developed information."

Chen, Yuchen. Chinese Communist policy on science and technology: changes and effects. Issues & studies, v. 15, June 1979: 45–64.

China is now stressing science and technology in its bid for modernization. Self-reliance is a goal to be met by obtaining the appropriate technology from other nations.

China under the four modernizations, part 1; selected papers submitted to the Joint Economic Committee, Congress of the United States. Washington, G.P.O., 1982. 610 p.

At head of title: 97th Cong., 2d sess. Joint committee print.

Classifying science: a government proposal . . . and a scientist's objection. Aviation week & space technology, v. 116, Feb. 8, 1982: 10–11, 81.

This article presents an exchange of ideas by the former Deputy Director of the Central Intelligence Agency Bobby R. Inman and William D. Carey of AAAS on government review and possible censorship of scientific research for reasons of national security.

Controversy over foreign policy export controls: pro & con. Congressional digest, v. 62, June-July 1983: 161–192.

Contents.—Evolution of export control policy.—Administration of the Act.—Overview of the current program.—Recent action in the Congress.—Pros & cons: should Congress curtail authority to impose foreign policy export controls?—Pro statements by Senator Heinz, Rep. L. Bonker, and the Scientific Apparatus Makers Association; Con statements by Senator Cohen, Rep. Beverly B. Byron, and Lionel Olmer, Under Secretary for International Trade Administration, Dept. of Commerce.

Corson, Dale. What price security? Physics today, v. 36, Feb. 1983: 42–45, 47.

"Evaluates trade-offs between dangers to national security that arise from technology transfers and threats to the openness of scientific communication that are caused by too much secrecy."

Dam, Kenneth W. Prepared statement of the Deputy Secretary, Dept. of State, before the Subcommittee on International Finance and Monetary Policy, Committee on Banking, Housing, and Urban Affairs, United States Senate. Washington, Mar. 16, 1983. 10 p.

In this draft statement the Deputy Secretary reviews the State Department's responsibilities in the area of export control. States that U.S. policy toward East-West trade "must take into consideration the need to reduce potential western vulnerability to Soviet economic pressures."

Destler, I. M. Making foreign economic policy. [Washington] Brookings Institution [c1980] 244 p.

The author examines the problem of overall U.S. foreign economic policymaking and coordination and provides a detailed, comparative analysis of recent experience in the areas of food and trade. Exploring how specific choices appeared to policymakers at crucial points in the seventies, including a review of experience during the Carter administration, Destler offers recommendations about the future management of foreign economic policy.

Donlan, Thomas G. Technology ban; for once the ratio of costs to benefits is right. Barron's, v. 60, Feb. 4, 1980: 11–12, 16.

Discusses how the U.S. technology embargo will hurt the Soviet Union, especially in computer technology.

Donovan, Christopher J. The Export Administration Act of 1979: refining United States export control machinery. Boston College international and comparative law review, v. 4, spring 1981: 77–114.

Comment examines past and present U.S. export control law and analyzes the modifications made by the Export Administration Act of 1979. Discusses recent

U.S. economic sanctions against the U.S.S.R. in light of the restrictions placed upon executive actions under the Act.

Dornan, Robert K. Exporting American technology: a national security perspective. Journal of social and political studies, v. 2, fall 1977: 131–142.

Discusses the importance of controlling advanced technology transfer, using large computers as the case in point. Describes institutional controls for technology transfer and how they should be strengthened.

Duffy, Gloria. Soviet nuclear energy: domestic and international policies. Santa Monica, Calif., Rand Corporation, 1979. 144 p. (Rand Corporation. [Report] R-2362-DOE)

Contents.—The past: "taking care of its own".—New trends: a positive policy.—Domestic roots of policy.—Inconsistencies and complications.—Dilemmas and opportunities.

DuTemple, Octave. PRC's nuclear program: a status report. Nuclear news, v. 25, Feb. 1982: 77–80.

Describes recent progress in nuclear research in the People's Republic of China.

——— China prepares for civilian nuclear power. Nuclear news, v. 23, Dec. 1980: 53–57.

Assesses the development of a civilian nuclear program in China. For the U.S. to participate in establishing China's nuclear program it must give China the same policy considerations accorded to other weapons states.

Dvorin, Shirley Miller. The Export Administration Act of 1979: an examination of foreign availability of controlled goods and technologies. Northwestern journal of international law and business, v. 2, spring 1980: 179–199.

This comment delineates the legislative history of the original Export Control Act of 1949 and subsequent legislation in order to trace the development of foreign availability concerns in export control legislation. Examines the concurrent development of COCOM as an instrumentality for effectuating multilateral export controls. Describes the new statutory scheme for determining foreign availability in the export licensing process.

East-West commercial policy: a congressional dialogue with the Reagan Administration; a study prepared for the use of the Joint Economic Committee, Congress of the United States. Washington, G.P.O., 1982. 73 p.

At head of title: 97th Cong., 2d sess. Joint committee print.

Illustrates that "from a European perspective, United States policy toward East-West trade appears incoherent and self-centered." Notes that European and Japanese cooperation is needed for an effective embargo of high technology to the Soviet bloc.

East-West technological co-operation: main findings of colloquium held 17th–19th March, 1976 in Brussels. Brussels, NATO-Directorate of Economic Affairs, 1976. 350 p.

East-West technology transfer—the case of Poland. OECD observer, no. 122, May 1983: 29–31.

"The 'new development strategy' adopted in 1972 by the Polish authorities sought to hasten the industrialisation of the economy through a vast programme of technology transfer from the West, using credits extended by the West's financial system. It represented a complete reversal of the strategy, in effect for over twenty years, designed to mobilise and adapt local resources and skills."

East-West trade: the prospects to 1985; studies prepared for the use of the Joint Economic Committee, Congress of the United States. Washington, G.P.O., 1982. 330 p.

At head of title: 97th Cong., 2d sess. Joint committee print.

Edsall, John Tileston. Scientific freedom and responsibility: a report of the AAAS Committee on Scientific Freedom and Responsibility. Washington, American Association for the Advancement of Science, 1975. 50 p. (AAAS miscellaneous publication, no. 75–4)

Ehlke, Richard C., and Harold C. Relyea. The Reagan Administration order on security classification: a critical assessment. Federal Bar news journal, v. 30, Feb. 1983: 91–97.

The authors review past security classification Executive Orders and state that they have successively narrowed the bases and discretion for assigning official secrecy to Executive Branch information and materials. They contend that the Reagan Administration's "E.O. 12356 clearly reverses this trend by expanding the categories of classifiable information, mandating that information falling within these categories be classified, making reclassification authority avail-

able, admonishing classifiers to err on the side of classification, and eliminating automatic declassification arrangements."

Eklund, Sigvard. East-West co-operation in nuclear energy and the role of the IAEA. Vienna, Vienna Institute for Comparative Economic Studies, 1979.16 1.

Traces the East-West cooperative efforts in the fields of atomic power, fast breeder reactors technology, nuclear research, radiation safety, nuclear security, and non-proliferation. Organizations involved are briefly described, e.g., International Atomic Energy Agency.

Ellicott, John L. Trends in export regulation. Business lawyer, v. 38, Feb. 1983: 533–553.

"The United States exercises controls over exports under a number of statutes with a potentially broad reach. This article outlines the principal relevant statutes, considers national security export controls directed to the Soviet Union and its allies, and examines export controls imposed for foreign policy reasons. The article comments briefly on enforcement and concludes by discussing foreign responses to U.S. controls, particularly their extraterritorial applications."

Ellis, James L. Trading with Czechoslovakia, [Washington] U.S. Domestic and International Business Administration, 1977. 46 p. (International marketing information series. Overseas business reports, OBR 77-54)

Partial contents.—The Czechoslovak economy—prospects for U.S. exports.—Information sources.—Foreign trade policy.—Foreign trade structure and organizations.—Joint ventures and investments.—U.S. regulations.—Trade promotion.—Bibliography.

Ember, Lois R. Secrecy in science: a contradiction in terms? Chemical & engineering news, v. 60, Apr. 5, 1982: 10–17.

While scientists and engineers say secrecy can stifle their enterprise, some government officials argue that national security dictates secrecy controls.

Energy politics: USA–USSR. Society, v. 18, July-Aug. 1981: 5–84.

Contents.—Political fallout, by J. Kemeny.—Communist nuclear practice, by J. Pilat.—Normal accident at Three Mile Island, by C. Perrow.—The hidden agenda of environmental reform, by S. Halpern.—Nuclear protest and national policy, by D. Nelkin and M. Pollak.—Destruction of nature in the Soviet Union, by B. Komarov.—The nuclear regulatory bureauracy, by J. Klein.—Managing nuclear waste, by T. LaPorte.—Accident analysis, by C. Marrett.—Soviet nuclear setbacks, by J. Harding.—From elite quarrel to mass movement, by R. Mitchell.

Evrard, John T. The Export Administration Act of 1979: analysis of its major provisions and potential impact on United States exporters. California Western international law journal, v. 12, winter 1982: 1–45.

"The concern of this Article is with the administrative and procedural provisions established by the [Export Administration Act] of 1979, which are aimed at resolving the conflicting export interests of private exporters and the government. The extent to which the licensing requirements and procedural provisions of the 1979 Act implement or inhibit the policy of expanded freedom which Congress intended to give exporters is analyzed, and the manner in which the policy is balanced with the government's mandate to protect United States interests through export controls is considered."

Ewing, A. F. Energy and East-West co-operation. Journal of world trade law, v. 15, May-June 1981: 218–230.

Describes "the new possibilities of east-west co-operation in the energy field as envisioned by the ECE [Economic Commission for Europe] experts; considers the associated problems of technology transfer, development and co-operation; and examines briefly the kinds of co-operation agreements involved, including their nature and legal character."

Favre, David, and Matthew McKinnon. The new prometheus: will scientific inquiry be bound by the chains of government regulation? Duquesne law review, v. 19, summer 1981: 651–730.

This article proposes that there exists a constitutional right of scientific inquiry, establishes a legal definition of the term scientific inquiry, and attempts to balance the right of scientific inquiry and the state's interest in protecting itself and its citizens.

Ferguson, James R. Scientific and technological expression: a problem in First Amendment theory. Harvard civil rights-civil liberties law review, v. 16, fall 1981: 519–560.

This article attempts "to fit the broad category of scientific speech within the current framework of established first amendment law." It applies "standard

first amendment doctrine to a number of constitutional problems involving state-imposed restrictions on scientific speech."

——— Scientific freedom, national security, and the First Amendment. Science, v. 221, Aug. 12, 1983: 620–624.

The author contends that if the Supreme Court applies its standard analysis to the debate over the government's efforts to control the export of scientific and technical knowledge it would give due weight to the value of scientific freedom but would also "examine critically the nature and magnitude of the threatened harm to national security."

——— Scientific inquiry and the First Amendment. Cornell law review, v. 64, Apr. 1979: 639–665.

Article examines the growing conflict between scientific freedom and the need for public safety and national security. The author concludes that scientific inquiry is a form of expression and as such deserves the protection of the First Amendment.

Freedenberg, Paul. U.S. export controls: issues for high technology industries. National journal, v. 14, Dec. 18, 1982: 2190–2193.

"The debate over the renewal of the Export Administration Act is certain to be a major legislative battle. Many of the critical questions of trade and foreign policy, and national security which have proven to be so difficult to solve over the past few years will be highlighted in the Act renewal."

Frost, Ellen L., and Angela E. Stent. NATO's troubles with East-West trade. International security, v. 8, summer 1983: 179–200.

Argues the NATO "alliance should thus move toward a two-track East-West trade policy, combining long-term predictability with short-term flexibility, so that the West can agree on continuity in the major security-related aspects of trade while reserving some instruments of commerce to respond to short-term political developments."

Funk, Roger. National security controls on the dissemination of privately generated scientific information. UCLA law review, v. 30, Dec. 1982: 405–454.

"This Comment concludes that the current national security statutes are ill-suited to the task of controlling privately generated scientific information to protect national security. Far from providing precise regulation of information whose dissemination could imperil national security, the statutes are vague, ambiguous, and excessive in reach."

Gallagher, Matthew P., and Karl F. Spielmann, Jr. Soviet decision-making for defense; a critique of U.S. perspectives on the arms race. New York, Praeger Publishers, 1972. 102 p. (Praeger special studies in international politics and government)

Garland, John. The role of East-West trade in Poland's economic crisis. ACES [Association for Comparative Economic Studies] bulletin, v. 24, spring 1982: 95–110.

"The tentative findings of this paper suggest that East-West trade may be much more a partial solution to the Polish crisis than it is a contributing cause of that crisis. Here the focus in regard to East-West trade is on industrial cooperation, through which Western firms transfer production technology and managerial know-how to their Polish partners through complex licensing, coproduction, and specialization agreements."

Gerjuoy, Edward. Embargo on ideas: the Reagan isolationism. Bulletin of the atomic scientists, v. 38, Nov. 1982: 31–37.

Claims "the Administration's use of export controls to restrict the flow of scientific information threatens the health of scientific research in the United States." Hopes that upcoming reviews of information control will lead to more reasonable policies.

Gershman, Carl. Our technology to Russia for profit. Business and society review, no. 32, winter 1979–80: 29–35.

Questions who really benefits from Soviet-American trade.

——— Selling them the rope: business & the Soviets. Commentary, v. 67, Apr. 1979: 35–45.

The author makes a plan for stricter U.S. control of the transfer of technology to the Soviet Union.

Glen, Maxwell. Exporting technology—can trade and national security coexist? National journal, v. 11, Aug. 18, 1979: 1370–1374.

Examines the debate over the export of high technology products to Communist countries.

Golan, Jeffrey W. U.S. technology transfers to the Soviet Union and the protection of national security. Law and policy in international business, v. 11, no. 3, 1979: 1037–1107.

Article traces "the major legislative efforts to establish a coherent and effective regime of controls over exports to communist countries." Includes in the discussion an analysis of the 1969 and 1979 Export Administration Acts.

Goldberg, Steven. The constitutional status of American science. University of Illinois law forum, v. 1979, no. 1, 1979: 1-33.

This article contends that "the framers designed the Constitution in part to protect freedom of science both through the establishment of religion clause, which prohibits government support for a traditional adversary of science, and through the speech and press clauses, which were understood from the outset to include scientific expression. After analyzing modern cases interpreting these clauses, the article concludes that scientific speech continues to enjoy full protection."

Gordon, Michael R. The grain embargo—no great impact on either the farmers or the Soviets. National journal, v. 12, Sept. 6, 1980: 1480-1484.

"Despite the Administration's claims and U.S. farmers' protests, Soviet grain imports and U.S. grain exports have hit record levels during the embargo."

Gosain, Vikram Aditya. Export licensing of advanced technology to Communist countries: problems and prospects. Hastings international and comparative law review, v. 1, winter 1978: 305-324.

Comment examines the Export Administration Act and the 1977 amendments to it. Discusses the procedure and criteria by which an export application is evaluated to illustrate problems in dealing with the trade-off between economic warfare and economic welfare. Makes proposals for reform of the act, contending that "exports should be curtailed only for national security or short supply reasons. National interest and foreign policy should be eliminated as valid grounds for application denials."

Greenberg, Joel. Science's new cold war. Science news, v. 123, Apr. 2, 1983: 218-222.

"Increasingly, U.S. scientists are being pressured by the government—primarily the military—to cut back on scientific exchanges with the Soviet Union for both 'national security' and political reasons. Some fear that the big loser will be science itself."

Guzzardi, Walter Jr. Cutting Russia's harvest of U.S. technology. Fortune, v. 107, May 30, 1983: 102-104, 107-108, 110, 112.

Contends that the main purpose of the Soviet's "raid" on western high technology is to increase Soviet military power.

Hanson, Philip. Western economic sanctions against the USSR: their nature and effectiveness. NATO Economics Directorate Colloquium, Apr. 1983. Birmingham, Eng., P. Hanson, University of Birmingham, 1983. 36 l.

Contends that the rationale for strategic embargo is not to inhibit West-East transfer but to hinder the Soviets from acquiring militarily useful technologies in which the West maintains a lead. States that "strategic embargo is not economic warfare."

Hardt, John P. East-West economic relations: alternative scenarios for the Atlantic Alliance. Cologne, Bundesinstitut fur Ostwissenschaftliche und Internationale Studien, 1983. 44 p.

Contents.—Kurzfassung.—Diversity in East-West.—Alternative alliance scenarios.—Outcomes of alliance deliberations: implications for Western relations with the East.

Healy, Dermot. The grain weapon. Aberdeen, Scotland, Centre for Defense Studies, 1982. 50 p. (Centre for Defence Studies. Centrepieces, no. 1)

Hegedus, Michael J., and Karen L. Jurew. Trading with Bulgaria. Washington, U.S. Dept. of Commerce, International Trade Administration, 1980. 20 p. (International marketing information series. Overseas business reports, OBR 80-05

Contents.—The Bulgarian economy.—Foreign trade.—Foreign trade structure.—Purchasing and selling procedures.—Industrial property protection.—Cooperation agreements and countertrade.—U.S. regulations.—Hints to U.S. business.—Bibliography.

Hewett, Edward A. The pipeline connection: issues for the alliance. Brookings review, v. 1, fall 1982: 15-20.

The author contends that "Europe and Russia both stand to gain from the gas pipeline deal. American attempts to stop it may be bringing the wrong results."

Hewett, Edward A., ed. Special issue on East-West technology transfer. ACES [Association for Comparative Economic Studies] bulletin, v. 22, spring 1980: 1-101.

Contents.—Introduction, by E. Hewett.—Problems of technology transfer in the Hungarian pharmaceutical industry, by E. Kiss.—Industry structure and East-West technology transfer: a case study of the pharmaceutical industry, by J. Brada.—The application of Western technology in the Hungarian agriculture

and food industries, by A. Elias.—Some aspects of the adaptation of the most advanced technical achievements in Hungary, by J. Juhasz.

High-tech censorship. New York, WNET/Thirteen, 1982. 7 p.

The MacNeil/Lehrer Report, Apr. 21, 1982.

Interview with George Davida, a cryptographer, Daniel Schwartz, former general counsel for the National Security Agency, Stephen Bryen of the Defense Department and William Carey of AAAS, on the impact of the Reagan Administration's policy of clamping down on the flow of information to the USSR.

Hoar, William P. Soviet military. American opinion, v. 24, Nov. 1981: 13–15, 17–18, 77, 79, 81, 83, 85–86.

"The struggling Soviet economy is being rescued by the West, which has supplied Russian industry with over $50 billion worth of modern machine tools, transfer lines, chemical plants, precision instruments, and associated technologies."

Holliday, George D. Technology transfer to the USSR, 1928–1937 and 1966–1975: the role of Western technology in Soviet economic development. Boulder, Colo., Westview Press, 1979. 225 p.

Hufbauer, Gary Clyde, and Jeffrey J. Schott. Economic sanctions in support of foreign policy goals. Washington, Institute for International Economics; Cambridge, Distributed by MIT Press, c1983. 102p. (Policy analyses in international economics, 6)

The authors examine cases of economic sanctions as instruments of foreign policy and analyses whether or not the sanctions succeeded in attaining foreign policy goals.

Industrial policies and technology transfers between East and West. Vienna, New York, Springer-Verlag, 1977. 316 p. (East-West European economic interaction workshop papers, v. 3)

Papers and proceedings from a conference sponsored by the Vienna Institute for Comparative Economic Studies.

Partial contents.—Technology, specialization and foreign trade, by N. Scott.—Concentration and specialization in Western industrial countries, by C. Saunders.—Concentration, specialization and cooperation in the CMEA-region, by M. Engert and M. Reich.—Comparative analysis of the research and innovation processes in East and West, by J. Slama and H. Vogel.—The impact of technology transfer on economic growth, by W. Trzeciakowski and E. Tabaczynski.—Forms and dimensions of technology transfer between East and West, by P. Hanson.—Case studies.

Information control. IEEE spectrum, v. 19, May 1982: 64–73.

Contents.—Technology transfer at issue: the academic viewpoint, by P. Gray.—Technology transfer at issue: the industry viewpoint, by P. Wallich.

The authors note that industry and academia are fighting the U.S. Government's attempt to stem the free flow of ideas in the name of National security. They claim that limiting the transfer of technical information could weaken the U.S. lead in innovation.

International Society for Human Rights. The use of forced labor on the Siberian gas-pipeline. Frankfurt, 1982. 39 p.

Presents evidence that prisoners are being used to construct the Trans-Siberian gas pipeline. Raises the question, "Should we share the guilt of exploiting forced labourers?"

International Slavic Conference, 1st, Banff, Alta., 1974. Economic development in the Soviet Union and Eastern Europe: the second-third of eight volumes of papers from the first international conference. Sponsored by the American Association for the Advancement of Slavic Studies . . . et al.; edited by Zbigniew M. Fallenbuchl. New York, Praeger, 1975–1976. 2 v. (Praeger special studies in international politics and government)

Issues in East-West commerical relations; a compendium of papers submitted to the Joint Economic Committee, Congress of the United States. Washington G.P.O., 1979. 322 p.

At head of title: 95th Cong., 2d sess. Joint committee print.

Contents.—East-West technology transfer.—Financing East-West trade.—United States-Soviet agricultural trade.—Maritime practices.—Problems and prospects.

This collection of papers grew out of an April 1978 Congressional Research Service Workshop on East-West Commercial Relations. The volume includes studies by specialists at CRS, the Bureau of East-West trade, the Department of Defense, the Department of State, and academic institutions.

Jacobson, Catherine. The technology transfer issue. Business America, v. 5, May 31, 1982: 2–5

Reviews hearings held by the Subcommittee on Investigations of the Senate Committee on Governmental Affairs which examined the effectiveness of law enforcement efforts in the area of technology transfer to the Soviet Union.

Janiszewski, Hubert A. Imports of technology by Poland. Journal of world trade law, v. 16, Mar.-Apr. 1982: 165–170.

"The purpose of this note is to provide, as accurately as possible, a picture of the imports of technology by Poland in the last decade and an attempt at a critical diagnosis of the massive imports of technology, which ultimately did not lead into the desired effects in terms of maintaining a steady rate of economic growth and an improvement in the balance of payments."

Kahn, Peter L. Squeezing the Soviets. Foreign Service journal, v. 59, Feb. 1982: 25–29.

The author contends that "President Reagan is leading the United States and its allies into an era of tightly controlled commerce with the Soviet Union. In the process, we may give up many of the benefits of East-West trade while doing little to enhance our military security."

Kaikati, Jack G. The anti-export policy of the U.S. California management review, v. 23, spring 1981: 5–19.

The author analyzes what he claims is "the anti-export policy of Congress and successive administrations, which have paid lip service to promoting exports while actually inhibiting them with laws and regulations."

Kalivoda, Kenneth. The Export Administration Act's technical data regulations: do they violate the First Amendment? Georgia journal of international & comparative law, v. 11, fall 1981: 563–587.

This comment "focuses upon the constitutional questions presented by the Export Administration technical date regulations both in general and as specifically applied to scientific meetings. A recent scientific conference held in California, upon which the Department of Commerce imposed the regulations, provides the context within which the issues are presented."

Kiser, John W., III. Tapping Eastern bloc technology. Harvard business review, v. 60, Mar.-Apr. 1982: 85–93.

"As the international economy becomes ever more competitive, the United States may be missing a bet in ignoring new technology in Eastern Europe and the Soviet Union. Although Americans tend to see the COMECON countries as technologically backward, some large U.S. companies have acquired licenses for highly useful processes and products from those markets."

Luttrell, Clifton B. The Russian grain embargo: dubious success. Federal Reserve Bank of St. Louis review, Aug.-Sept. 1980: 2–8.

The author argues that "although the embargo on grain sales to the Soviets was designed with the best of intentions, it had only a negligible impact on Soviet grain supply and on total U.S. grain exports. Estimates of the Soviet grain supply for the year ending in June were only one percent less than the pre-embargo forecasts. Estimates of U.S. grain exports were reduced sharply immediately following the embargo, but rose very soon after it was announced and, by July of this year, were approximately the same as the pre-embargo estimates."

Madison, Christopher. Congress, Administration split on how to plug technology leaks to Soviets. National journal, v. 15, Feb. 19, 1983: 380–383.

Discusses the difference of opinion between those who want to tighten the Export Administration Act to stem the flow of technology to the East and others who think the law already goes too far.

——— Trading with the Soviets—should we offer a carrot or wield a stick? National journal, v. 13, May 9, 1981: 820–823.

Examines problems in formulating U.S. trade policy toward the U.S.S.R. as the grain embargo is lifted while stricter controls on exports of high technology are considered.

Maechling, Charles, Jr. US–EC relations: Siberian pipe dream? Europe, no. 233, Sept.-Oct. 1982: 2–6.

Discusses the European objections to the Reagan Administration's embargo on equipment sales by European licensees and subsidiaries of U.S. companies for the Soviet gas pipeline.

Mally, Gerhard. Technology transfer controls. Atlantic Community quarterly, v. 20, fall 1982: 233–238.

Examines U.S. export controls of dual use technologies to Warsaw Pact countries and communist countries of East Asia.

Managing the flow of technical information—an industry/government dialogue. Piscataway, N.J., Institute of Electrical and Electronics Engineers, 1982. 20 p.

This roundtable, held on June 2, 1982 in Washington, D.C., was sponsored by IEEE Spectrum magazine with the participation of George A. Keyworth, Science Advisor to the President.

Participants in this roundtable "agreed that the current system of export controls on information does not work as it ought to. Industry participants complained that paperwork involved with regulations hampers trade and questioned whether they actually limited the spread of militarily significant information, while government representatives cited insufficient staff as a problem in handling licensing, and also noted that covert operations by Soviet-bloc nations could render laws controlling export of technical information irrelevant."

Mann, Paul. Curb sought on export sanctions. Aviation week & space technology, v. 118, Mar. 7, 1983: 14–17.

"U.S. business and manufacturing officials are pressing Congress to restrict the President's statutory authority to impose export sanctions for national security and foreign policy reasons. Their action is occasioned by the approaching end of the Export Administration Act of 1979, which expires Sept. 30. Congress has begun deliberations on reauthorizing the act, raising an array of issues concerning every facet of U.S. export controls."

Marks, Thomas A. Two Chinese roads to military modernization—and a U.S. dilemma. Strategic review, v. 7, summer 1980: 18–28.

"Communist China has begun to modify its obsession with military self sufficiency in favor of selective technological acquisitions from Western nations. The Republic of China on Taiwan has traveled the road of modernization longer. . . . The United States in its arms policies vis-a-vis Peking must pay sensitive heed to an increasingly delicate military balance between the two Chinas."

Martin, Harry V., and Robert Carroll. Electronics companies combat increased Soviet spying. Defense electronics, v. 13, July 1981: 34–35, 37, 39, 41–42, 44, 46.

"According to several U.S. government sources, the Soviets alone have been able to gain access to billions of dollars worth of American high technology through multiple avenues—many of them by perfectly legitimate means, openly fostered by the U.S. government, and many through illegal methods."

Mathieson, Raymond S. Japan's role in Soviet economic growth: transfer of technology since 1965. New York, Praeger Publishers, 1979. 277 p.

Meese, Sally A. Export controls to China: an emerging trend for dual-use exports. International trade law journal, v. 7, fall-winter 1981–82: 20–37.

Article presents a summary of the evolution of the U.S. export control system, explains the regulatory licensing procedures with which an American exporter might comply and assesses future prospects for U.S.-China trade in view of the current Reagan Administration policy.

McIntyre, John R., and Richard T. Cupitt. East-West strategic trade control: crumbling consensus? Survey, v. 25, spring 1980: 81–108.

The authors "give a retrospective view of the evolution and derivation of the Western international trade control list from its inception in 1949 up to the present list review. . . . [They] provide a historical and an institutional perspective on Western multilateral technology transfer policy."

McMenamin, Michael, and Walter McNamara. The great grain charade. Inquiry (San Francisco) v. 4, Feb. 23, 1981: 13–17.

Authors posit that the U.S. grain embargo against the U.S.S.R. has been a policy failure because U.S. grain on the world market reached the Soviets through middlemen and U.S. consumers and taxpayers were the real losers as the Soviets bid the price of grain up on the world market.

Miller, Mark E. The role of Western technology in Soviet strategy. Orbis, v. 22, fall 1978: 539–568.

Describes the underlying weaknesses of the Soviet economy, the most effective forms of technology transfer, the impact of this technology on Soviet economic development, and the strategic implications of technology transfer to the Soviet Union.

Morgan, Dan. The politics of grain. Alantic, v. 246, July 1980: 29–34.

Contends that the U.S. has been subsidizing the rest of the world with its grain. Believes that foreign customers should pay a share of the hidden costs of grain exports. These hidden costs include shrinking agricultural land and water supplies and strains on the U.S. transportation system. Urges a stronger governmental role in the pricing of grain exports and the establishment of a

system of cooperative pricing and marketing of grain among the major grain exporters.

Muller, Friedmann. East-West trade and security policy. Aussenpolitik, v. 30, no. 2, 1979: 172–183.

Examines the importance of economic relations between East and West in terms of security policy. Discusses three problem areas: the transfer of technology, national dependence, and interdependence and detente.

Murphy, John F., and Arthur T. Downey. National security, foreign policy and individual rights: the quandry of United States export controls. International and comparative law quarterly, v. 30, Oct. 1981: 791–834.

Article examines "the law and practice of U.S. export controls. The Export Administration Act of 1979 will be high-lighted throughout with respect to export controls imposed for national security reasons and foreign policy purposes. Part III deals with the control process and individual rights, a subject which will be of increasing interest."

National Academy of Sciences, Washington, D.C. Scientific communication and national security. Washington, National Academy Press, 1982. 188 p.

Partial contents.—Current knowledge about unwanted technology transfer and its military significance.—Universities and scientific communication.—The current control system.—General conclusions: balancing the costs and benefits of control.

Nelkin, Dorothy. Intellectual property: the control of scientific information. Science, v. 216, May 14, 1982: 704–708.

"Control of scientific information is increasingly at the center of legal and administrative disputes, raising questions of sovereignty and secrecy, of proprietary rights over research. Disputes originate from efforts to extend the right of access to data at an early stage of research, from demands for information that threaten confidentiality, from proprietary interests in competitive areas of research, and from government restrictions on the free exchange of scientific ideas. They reflect policy changes with respect to information disclosure, university-industry collaboration, patent rights, and national security."

Nicoloff, Olivier. Value of food as weapon more symbolic than real. International perspectives, Sept.-Oct. 1980: 19–21.

The author concludes that the use of food as a weapon is inapplicable for the time being. "It failed when used against the U.S.S.R. and was not even attempted against Iran."

O'Connor, Colleen M. Going against the grain: the regulation of the international wheat trade from 1933 to the 1980 Soviet grain embargo. Boston College international and comparative law review, v. 5, winter 1982: 225–270.

Comment examines the operation and regulation of the international wheat trade with emphasis on the degree to which regulation has achieved its goals. Examines past and present international wheat agreements.

O'Dowd, Edward C. The United States and the problem of Chinese military modernization. Joint perspectives, v. 2, summer 1981: 58–69.

"The United States has stated that it will transfer arms and technology to China. This policy may not parallel China's stated goals; it may not improve the Chinese defense posture; and it may not be in the best interest of the United States. The author contends that there are several compelling reasons why it is to both nations' advantage to adopt a 'go slow' policy toward Chinese military modernization."

Olds, F. C. Worldwide experience and growth of nuclear power. Power engineering, v. 86, Nov. 1982: 31–34.

Observes the growth of nuclear power in CMEA countries while OECD countries are slowing the pace of their nuclear power programs.

Paarlberg, Robert L. Lessons of the grain embargo. Foreign affairs, v. 59, fall 1980: 144–162.

The author maintains that the grain embargo had little effect on Soviet food supplies while it helped to dispel U.S. illusions about its own "food power."

Perle, Richard N. Raiding the free world's technology. Aerospace, v. 20, spring 1982: 10–13.

Contends that "the U.S.S.R. has taken advantage of our loose export controls and—legally or otherwise—acquired vital goods and equipment."

——— Technology and the quiet war. Strategic review, v. 11, 1983: 29–35.

"Russia historically has battened upon Western industrial advances, but the Soviets have elevated the absorption of Western technology and know-how into a pervasive strategy waged across both legal and clandestine fronts. In this they have been able to take advantage not only of the open windows of democracies,

but also of doors placed ajar by liberalized Western export controls. Even a partial listing of Soviet military advances derived from technological infusions from abroad traces the depth of the dilemma."

Pike, John. When science is outlawed . . . Inquiry (San Francisco), v. 5, Mar. 29, 1982: 21–25.

Cautions that the Reagan Administration may be seeking to impose mandatory restrictions on the dissemination of scientific and technical information in the name of national security, including prepublication reveiw of technical papers and increased controls on scientific exchanges with the Soviet Union.

Pilon, Juliana Geran. Double dealing. Reason, v. 14, Feb. 1983: 37–42.

The author charges that the Soviets have received sophisticated technology and equipment from U.S. companies that have improved its strategic capabilties. She maintains that "rather than continually raising the federal defense bill, it would seem much wiser to apply the proverbial ounce of prevention and simply monitor, intelligently and consistantly, the sale of those items that demonstrably contribute to advancing the Soviet military."

The premises of East-West commercial relations. A workshop sponsored by the Committee on Foreign Relations, United States Senate, and Congressional Research Service. Washington, G.P.O., 1983. 196 p.

At head of title: 97th Cong., 2d sess. Committee print.

The workshop was held on December 14–15, 1982 and contains statements by John Hardt of the Congressional Research Service; Edward A. Hewett of the Brookings Institution; Kempton B. Jenkins, vice president of ARMCO and U.S.-U.S.S.R. Trade and Economic Council; Howard Lewis III of the National Association of Manufacturers; Stanley J. Marcus, former Senior Deputy Assistant Secretary for Trade Administration, Department of Commerce; Charles Percy, Chairman, Senate Committee on Foreign Relations; Dimitri K. Simes, executive director, Soviet and East European Research Program, Johns Hopkins School of Advanced International Studies; Vladimir G. Treml, professor of economics, Duke University; and Jan Vanous, senior economist, Wharton Econometric Forecasting Associates, Inc.

Prybyla, Jan S. China's economic readjustment. Current history, v. 81, Sept. 1982: 264–267, 278–280.

Surveys economic problems and prospects in China. Discusses China's efforts to reform its economy and its dependence on Western trade and technology. Concludes that "so far, despite the spectacular alterations in China's economy as compared with its Maoist past, the exchanges have been by and large limited to technical upgrading. With the exception of the Responsibility System in agriculture, reforms touching the core of the system of economic organization are notable for their caution and potential reversibility."

Public Cryptography Study Group. Report. Academe, v. 67, Dec. 1981: 372–382.

The Public Cryptography Study Group was assembled by the American Council on Education in response to the National Security Agency's concern that information contained in professional journals and monographs might be inimical to national security. The Study Group "recommended that a voluntary system of prior review of cryptology manuscripts be instituted on an experimental basis. While the group would prefer no such system of review, its members, with one dissent, accepted as a working premise NSA's concern that some information contained in cryptology manuscripts could be inimical to the national security of the United States and saw the proposed system as a potential way to test that working premise. The group rejected a compulsory statutory solution to the perceived problem."

Randolph, R. Sean. Trading with the enemy: a happy way to die? National review, v. 32, Sept. 19, 1980: 1132–1133, 1136–1137.

Discusses the sale to the Soviet Union and its allies of "dual-use technologies" which are capable of both civil and military applications. Examines cases were technology has been diverted to military purposes.

Rankin, Peter J. The grain embargo. Washington quarterly, v. 3, summer 1980: 141–153.

"Before we consign that grain embargo to the rubbish and conclude that food power in general is ineffective, it is worth examining the embargo to see what went wrong." Article concludes that "a message needed to be conveyed: embargoes have some advantages over missiles as a means of conveying messages. The costs should be ascribed to the general mismanagement of foreign policy, noting the general ineffectivness of food power or interdependence power."

Reilly, Ann M. Curbing the flow of technology to the Soviets. Dun's business month, v. 119, Jan. 1982: 48, 53–54.

Sees the Soviets acquiring the technology they want through espionage and the willingness of other countries to do business with them.

Relyea, Harold C. Business, trade secrets, and information access policy developments in other countries: an overview. Administrative law review, v. 34, spring 1982: 315–317.

"Using available translated literature, necessary supplemented by more contemporary oral accounts, this overview . . . provides an accurate capsule description of existing or emerging policy embodying a right of access to official information or records in the possession of certain national governments or some segment of same. This presentation is made both in general terms and with particular attention to the interests and concerns of the business community regarding such policy. Research for this study was concluded in the spring of 1981."

——— Information, secrecy, and atomic energy. New York University review of law and social change, v. 10, no. 2, 1980–1981: 265–286.

Article considers the President's concern regarding the availability of atomic power information. "It focuses on the evolution of atomic energy information regulation in the United States and the implications of this regulation for the American democratic policy as well as for the rights and liberties of the American people."

——— The Presidency and the people's right to know. In the Presidency and information policy, by Harold C. Relyea, with Larry S. Berman [and others]. New York, Center for the Study of the Presidency, c1981. (Proceedings, Center for the Study of the Presidency, v. 4, no. 1) p. 1–33.

Roosa, Robert V., Michiya Matsukawa, and Armin Gutowski. East-West trade at a crossroads: economic relations with the Soviet Union and Eastern Europe. New York, New York University Press, 1982. 119p. (Report to the Trilateral Commission: 24)

"This study attempts to outline an approach in trade and financial affairs which might be suitable for any Western strategic doctrine on relations with the East that presumes: an overriding need to maintain peaceful conditions, a continuing need for a balanced stand-off in military capability, and an unrelenting rivalry between the two sides in attempting to extend the influence of their competing political systems."

Rosenblatt, Jean. Controlling scientific information. [Washington, Congressional Quarterly] 1982. 491–508 p. (Editorial research reports, 1982, v. 2, no. 1)

Contents—Federal restraints at issues.—Current government controls.—Attempts to strike a balance.

Rosenblatt, Samuel M. East-West trade in technology: a purpose in search of a policy. [Washington, International Economic Studies Institute, c1980] 64 p. (Contemporary issues, no. 4)

Discusses costs and benefits and the policy dilemma facing the U.S. in foreign trade in technology with the Communist countries. Provides a legislative history of the U.S. export control system and examines the unilateral U.S. export control administration system and the multilateral export control administration system by COCOM. Also gives an assessment of the export control system.

Schlechty, David L. Export control policy and licensing program of the Reagan Administration: new focus-new direction. Federal Bar news & journal, v. 29, Jan. 1982: 33–37.

"This paper presents a report on the Administration's emerging East-West trade policy and its progress in implementing the 1979 Export Administration Act. It deals with the efforts over the past 12 months of improving the export control program."

Schneider, William Jr. Remarks by the Under Secretary For Security Assistance, Science and Technology, Dept. of State, before the World Business Council, [Washington] Mar. 22, 1983. 11 p.

The Under Secretary discusses the national security implications of export policy. He states that the Reagan Administration's trade policy towards the Soviet Union and the Warsaw Pact "cannot be divorced from our broad political security objectives vis-a-vis these countries. . . . Our economic policies must support our key objectives of deterring the Soviet adventurism, redressing the military balance between the West and the Warsaw Pact and strengthening the Western Alliance."

Science and technology in the People's Republic of China. [Paris] Organisation for Economic Co-operation and Development [1977] 216 p.

The starting point for this study was a seminar held under the auspices of the OECD Committee for Scientific and Technological Policy held in January 1976.

Seminar participants included specialists who have devoted their energies to the study of Chinese science policy and recent visitors to China who are themselves scientists or science policy experts.

Science, technology, and American diplomacy 1983; fourth annual report submitted to the Congress by the President pursuant to section 503(b) of Title V of Public Law 95–426. Washington, For sale by the Supt. of Docs., G.P.O. 1983. 136 p.

At head of title: Joint committee print

"Printed for the use of the [House] Committee on Foreign Affairs and Science and Technology respectively."

"Serial W Committee on Science and Technology"

Scientific exchanges and U.S. national security. Science, v. 215, Jan. 8, 1982: 139–141.

Reprints verbatim an October 9, 1981 letter to Frank Carlucci, Deputy Secretary of the Department of Defense, by William D. Carey, executive officer and publisher of Science magazine, which criticizes statements by the Department of Defense concerning scientific exchanges, conferences, and unclassified, open scientific literature. Carlucci's follows.

[A Scientist's view of government control over scientific publication and an alternative view] IEEE technology and society magazine, v. 1, Sept. 1982: 17–23.

In this exchange of ideas, Peter Denning of the Association for Computing Machinery and Admiral Bobby Inman, former Deputy Director of the CIA, discuss scientific freedom and national security. While Denning sees the true clash to be between "secrecy and openness," i.e. scientific investigation should be conducted in the open and the results open full peer review, Inman sees a need to protect certain information from coming into the hands of "foreign enemies." Inman maintains that foreign intelligence services collect information from Federal agencies, corporations, and universities.

Seeger, Murray. Tightening up the high-tech trade. Fortune, v. 104, Dec. 28, 1981: 101–106.

"If the Reagan Administration decides to act alone in preventing high-tech know-how from reaching the Soviets, the effort could easily backfire. The best of America's Western competitors might sell Moscow all it is willing to pay for, while U.S. companies would be frozen out of the market."

Senese, Donald J. Western aid to mainland China: the crucial factors. Journal of social and political studies, v. 5, spring-summer 1980: 119–131.

"Despite the potential of a large 'China Market,' seemingly available because of the People's Republic of China's 'modernization' thrust, the United States and Western nations should proceed with caution. The promises are more illusory than realistic. China, which views trade and other actions of traditional diplomacy as political weapons, may seek only to build its strength in order to later challenge the very nations which are supplying China's new needs," warns the author.

Senior conference on integrating national security and trade policy: the United States and the Soviet Union; final report, 15–17 June 1978. West Point, N.Y., 1978. 212 p.

Partial contents.—Defense, dualism, and technology in the Soviet Union, by L. Badgett.—Military or economic superpower: a Soviet choice, by J. Hardt.—Soviet energy problems and prospects: implications for U.S. and Soviet national security policies, by T. Cobb.—The transfer of software technology to the Soviet Union, by S. Goodman.—American technology and national security, by C. Phipps.—A historical perspective on export controls, by R. Klitgaard.—Integrating national security and trade policy: the United States and the Soviet Union, the multilateral aspect, by A. Downey.

Shillinglaw, Thomas L., and Daniel D. Stein. Doing business in the Soviet Union. Law and policy in international business, v. 13, no. 1, 1981: 1–87.

Article "examines those areas of U.S. and Soviet law that are most important to U.S. businesses and attorneys involved in U.S.-Soviet trade." Discusses contracts with Soviet Foreign Trade Organizations, examines the operation of selected Soviet, multilateral and U.S.-Soviet organizations involved in Soviet trade, addresses U.S. export controls and import restrictions, explores the practical problems of establishing a Moscow office and describes Soviet taxation of foreigners.

Smith, R. Jeffrey. Eastern bloc evades technology embargo. Science, v. 211, Jan. 23, 1981: 364–366, 368.

Claims that "front companies in the West buy embargoes U.S. technology with virtual impunity" to sell to the Eastern bloc.

Sobeslavsky, Vladimir. East-West detente and technology transfer. World today, v. 36, Oct. 1980: 374–381.

Examines what would be the long-term economic costs of terminating detente.

Sokoloff, Georges, and Francoise Lemoine. China and the U.S.S.R.: limits to trade with the West. Paris, Atlantic Institute for International Affairs [1982] 70 p. (The Atlantic papers, no. 46)

The first paper points out the mixed objectives which trade with the West by the Soviet Union serves in the view of the Soviet leadership, and concludes that it simply cannot be assumed that the potential Soviet market will continue to expand during the 1980s as it did at least until the late 1970's. The second paper takes a realistic look at the China market and concludes that, while the market potential in demographic and geographic terms is seemingly large, there are some clear limiting factors.

Solo, Robert A. The dilemmas of technology: a review article. Journal of economic issues, v. 13, Sept. 1979: 733–742.

Analyzes the book "Technology, Trade and the U.S. Economy" and theorizes that the decline of U.S. technology is rooted in "arrogant insularity"—the failure to consider the policies and experiences of those nations that now surpass the U.S. in technological innovation.

Sosland, Morton I. US grain as central force in rational world food policy. Financier, v. 5, Jan. 1981: 35–40.

Author posits that given the increasing significance of grain in both the domestic and world economies, "the new Administration has a remarkable opportunity to lead the way in the creation of a rational world food structure, in which the US granary would exercise central force."

Soviet economy in a new perspective; a compendium of papers submitted to the Joint Economic Committee, Congress of the United States. Washington, G.P.O., 1976. 821 p.

At head of title: 94th Cong., 2d sess. Joint committee print.

Contains papers written by scholars and specialists on the recent performance of the Soviet economy, focusing on economic policy, the defense burden, agriculture, politics, energy, industry, population, research, international trade, and foreign aid.

Soviet economy in a time of change; a compendium of papers submitted to the Joint Economic Committee, Congress of the United States. Washington, G.P.O., 1979. 2 v.

At head of title: 96th Cong., 1st sess. Joint committee print.

Soviet economy in the 1980's: problems and prospects; selected papers submitted to the Joint Economic Committee, Congress of the United States. Washington, G.P.O., 1983. 2 v.

At head of title: 97th Congress, 2nd session. Joint committee print.

John Hardt of the Congressional Research Service helped plan the scope of the research and coordinated and edited the papers.

Stein, Ellen L. The politics of Soviet oil. Energy policy, v. 8, Sept. 1980: 203–212.

Suggests that the U.S. should export technology to the USSR "so that Soviet domestic energy production can be expanded and the political repercussions of an energy shortfall in the USSR avoided."

Stern, Jonathan P. Specters and pipe dreams. Foreign policy, no. 48, fall 1982: 21–36.

Discusses the economic, political, and security issues surrounding the Soviet gas pipeline controversy including Western European energy supplies and alternatives, and U.S.-economic sanctions and their effect on the NATO Alliance.

Sternheimer, Stephen. East-West technology transfer: Japan and the Communist bloc. Beverly Hills, Sage Publications, 1980. 88 p. (The Washington papers, v. VIII, 76)

Analyzes Japan's policy of exporting advanced technology to the Communist bloc in light of U.S. determination to restrict the flow of such technology for strategic reasons.

Stuart, Douglas T., and William T. Tow. Chinese military modernization: the Western arms connection. China quarterly, no. 90, June 1982: 253–270.

The authors "trace the evolution of Sino-American arms trade policy since 1972 and discuss the wide gap between arms talks and arms purchases in China's trade with the U.S. and other OECD states." They survey "factors that constrain Chinese arms purchasing at present and conclude with some observations on the potential diplomatic risks involved in any further effort by the U.S. unilaterally to arm China, or to sponsor a new China differential in the west."

Sullivan, Robert E., and Nancy E. Bader. The application of export control laws to scientific research at universities. Journal of college and university law, v. 9, no. 4, 1982–83: 451–467.

"This article examines actions taken by the government to restrict intellectual exchanges with foreign scholars; analyzes the laws upon which the government has relied; and concludes that reliance upon those laws and their application to the activities of university scientists is inappropriate and, possibly, unconstitutional."

Tahtinen, Dale R. Critical technology controls: issues and outlook. Address by the Deputy Assistant Secretary for International Trade Controls, Dept. of State before the Technical Marketing Society of America. Los Angeles, Sept. 13, 1983. 14 1.

The Deputy Assistant Secretary discusses U.S. and Allied actions to control the transfer of militarily significant technology and equipment to the Soviet Union and the Warsaw Pact.

——— Economic relations between East and West. Address by the Deputy Assistant Secretary for International Trade Controls, Dept. of State, before the Conference of the International Institute for Strategic Studies, Ottawa, Sept. 8–11, 1983. 18 1.

In this speech the Deputy Secretary states that "the Reagan Administration supports trade between the West and the Communist nations—as between any nations—where that trade is conducted at prevailing market prices and terms, where there is a mutual balance of advantages, and where the specific transaction (or category of transactions) does not contribute directly to the strategic advantage of the Soviets. Western consumers and producers, both agricultural and industrial, can benefit from such trade.

The Technological level of Soviet industry. Edited by Ronald Amann, Julian Cooper and R. W. Davies, with the assistance of Hugh Jenkins. New Haven, Yale University Press, 1977. 575 p.

Technology and Communist culture: the socio-cultural impact of technology under socialism. Edited by Frederic J. Fleron, Jr. New York, Praeger, 1977. 518 p. (Praeger special studies in international politics and government)

Technology, trade, and the U.S. economy. Washington, National Academy of Sciences, 1978. 169 p.

"Report of a workshop held at Woods Hole, Massachusetts, August 22–31, 1976, conducted by the Office of the Foreign Secretary, National Academy of Engineering, and Assembly of Engineering, National Research Council."

Contents.—A background review of the relationships between technological innovation and the economy.—Technology transfer and trade between the United States and the other OECD nations: critical issues.—The international transfer of technology, international trade, and international investment: the point of view of U.S. organized labor.—U.S. trade and technology transfer to the Soviet Union and the Eastern European nations.—Technology and trade issues relating to developing nations.

Technology transfer and U.S. foreign policy. Edited by Henry R. Nau. New York, Praeger, 1976. 325 p. (Praeger special studies in U.S. economic, social, and political issues)

Theroux, Eugene A. Technology sales to China: new laws and old problems. Journal of international law and economics, v. 14, no. 2, 1980: 185–251.

This article contends that though China's economy is comparatively backward, it has begun a comprehensive modernization program. Explores the beginning of a commercial legal system in China.

Thoma, George A. The structure of trade between the United States and the Soviet Union. Texas business review, v. 54, Nov.-Dec. 1980: 294–297.

Examines the components of trade with the U.S.S.R. and the effects of the U.S. trade embargo.

Tow, William T., and Douglas T. Stuart. China's military turns to the West. International affairs (London), v. 57, spring 1981: 286–300.

The authors review China's military modernization program and describe China's efforts to acquire Western military technology.

Tow, William T., Sino-Japanese security cooperation: evolution and prospects. Pacific affairs, v. 56, spring 1983: 51–83.

Examines the development of Sino-Japanese strategic relations in terms of their present and potential impact in East Asian security. Reviews "Japanese high-technology transfers to China, the extended Japanese defense role's effect on China's own security perceptions, and the impact of South Korea and ASEAN on Sino-Japanese strategic collaboration."

Trade, technology and leverage. Foreign policy, no. 32, fall 1978: 63–106.

Contents.—Trade, technology, and leverage: economic diplomacy, by S. Huntington.—The limits of pressure, by F. Holzman and R. Portes.—What gap? Which gap? by J. Kiser.—Technology exports and national security, by M. Mountain.—Sending signals, by R. Klitgaard.

Unger, Stephen H. The growing threat of government secrecy. Technology review, v. 85, Feb-Mar. 1982: 30–39, 84–85.

Maintains that "under the guise of national security, barriers are being erected to the free flow of scientific information. This trend endangers fundamental freedoms and, ironically, may damage U.S. technological development."

U.S. Bureau of East-West Trade. Selected trade and economic data of the centrally planned economies. [Washington] 1978. 63 p.

Presents economic data intended to provide some insight into the potential of the U.S.S.R., the PRC, and the Eastern European markets for U.S. goods and services, summarizing trade patterns between the centrally planned economies and the U.S. and other Western industrialized nations.

U.S. Central Intelligence Agency. Directorate of Intelligence. The Soviet forced labor system. [n.p.] 1982. 28 p.

"GIM 82-10241, Nov. 1982"

This unclassified report assesses reports of the use of forced labor in the USSR and the use of forced laborers on the West Siberia-to-Europe natural gas pipeline.

U.S. Central Intelligence Agency. National Foreign Assessment Center. Soviet chemical equipment purchases from the West: impact on production and foreign trade. [n.p.] 1978. 34 p.

"ER 78-10554, Oct. 1978"

This review of Soviet chemical equipment purchases during 1971–75 finds that "despite the large infusions of Western equipment and technology, the USSR remains an overall net importer of chemical products, and with few exceptions, it has not even become an important exporter of selected chemicals." However, predicts a sharp increase in chemical exports in 1980 and beyond. Includes a listing of individual equipment purchases during 1971–1975.

U.S. Central Intelligence Agency. Office of the Director of Central Intelligence. Soviet acquisition of Western technology. Washington, Central Intelligence Agency, 1982. 15 p.

This CIA report summarizes the extent to which Western techology has contributed to the Soviet military buildup. The report can also be found in Remarks of William L. Armstrong. Congressional record [daily ed.] v. 128, May 19, 1982: S5589–S5594.

U.S. Central Intelligence Agency. Office of Soviet Analysis. U.S.S.R.: economic trends and policy development. Briefing paper presented to the Subcommittee on International Trade, Finance, and Security Economics, Joint Economic Committee, United States Congress, for hearings on the allocation of resources in the Soviet Union and China—1983. Washington, CIA, 1983. 67 1.

Summarizes the performance of the Soviet economy in 1981–1982. Contends that economic growth has been sluggish. Examines the economic policies being pursued by Andropov and the effect these policies will have on Soviet Economic growth in the near and long term.

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